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THE COPPER HANDBOOK

A MANUAL OF

THE COPPER MINING INDUSTRY OF THE WORLD

Founded by Horace J. Stevens.

BY

WALTER HARVEY WEED, E. M.

Former Geologist in the U. S. Geological Survey, 1883-1906. Member
Institution of Mining and Metallurgy of America; Fellow
Geological Society of America; Member American
Institute of Mining Engineers, etc., etc.

VOL. XI.

1912-1913

Supplementing Volumes I to X.

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1914

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Prepared by Walter Harvey Weed

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PREFACE.

The Copper Handbook was acquired by the present editor one year after Mr. Stevens' death, an interval in which the loss of Mr. Stevens' personality was keenly felt. Since then nine months of constant, unremitting work have been required to prepare this volume for the press and no other apology can be offered for its tardy appearance.

For twelve years, The Copper Handbook has been the accepted authority on the copper industry and has given an impartial and fearless account of all known copper mining companies. In the present volume, the new editor will continue the same frank policy, giving accurate and recent information concerning both companies and properties with opinions thereon.

The address, personnel and description of the mining companies have been revised and rewritten from a personal knowledge of all the copper districts of the Continent, supplemented by information supplied by practicing engineers and checked by returns furnished by the companies themselves. Corrections and new information will be gladly received for future editions.

As in former editions of The Copper Handbook, many gold, silver and lead mines, producing copper as a by-product, have been included, practically making the book a mining manual, at least for America.

The former arrangement of the volume has been changed to make it more convenient for reference. All North American mines, including those of the United States, Mexico, Canada and Newfoundland, are grouped in Part I; all others, as foreign companies, in Part III, a comprehensive geographic index separating the two parts. All dead companies, including those liquidated, merged with or succeeded by others, are listed in Part V, accompanied by a reference to the earlier volume in which the company is described.

Copper statistics, including productions, exports, imports, prices, dividends, charts and facts of general interest, are given in Part IV.

In the descriptive chapters, the titles are alphabetically arranged, but a GEOGRAPHICAL INDEX has been added with the mines grouped by States, Counties and Mining Districts. By this list, one can readily locate any mine, or company, operating in a given district and it should prove a great help to the visitor in any mining camp, or to one to whom the exact title of a company is either unknown or cannot be recalled. Many *mines* are listed under their own names with a cross reference to the holding company.

In the alphabetical arrangement, the definite article and the words *Societe*, *Sociedad*, *Compania*, etc., have been transposed, the title being listed according to its principal, or distinctive word; for example, "Achaiches; Societe Anonyme des Mines de Cuivre de." Where the property of an American company is in a foreign land, for example the Braden company, whose holdings are in Chile, the title appears in the American section while the mines are described in Part III.

Many companies fully described in former editions, but inactive at present, receive brief notice in the present book. Excerpts from previous volumes containing descriptions of such companies can be purchased from the Copper Handbook office for fifty cents each.

The author will gladly receive corrections or comments, since it is realized that it is only by such help that The Copper Handbook can be kept correct and up-to-date.

WALTER HARVEY WEED.

Houghton, Mich., Jan. 2, 1914.



HORACE JARED STEVENS,

1862-1912.

HORACE JARED STEVENS,

Founder of The Copper Handbook.

Horace Jared Stevens, founder of The Copper Handbook, writer, journalist, copper expert and Man, died April 12, 1912. Born in Conewango, N. Y., Jan. 5, 1866, educated in public school, in the Beaufort iron mine and the printing office, his wonderfully retentive memory enabled him to acquire a wealth of information which made him an authority in the Copper Industry. With an experience of several years in varied work in the iron mines, his inborn interest in the mining industry found outlet as special reporter for the *Marquette Mining Journal*, first at Ishpeming and later in the broader field of the Copper Range. He organized the Peninsula News Bureau and it was this work which led him to see the need for an authoritative annual on copper mining and supplied the facts for the first volume, published in 1900.

From a modest volume of 300 pages covering Michigan mines, The Copper Handbook grew until at the time of his death, it was a work of 1987 pages covering the copper mines of the world.

An uncompromising foe to fraud, his frank statements have given The Copper Handbook a unique reputation for its naked truths about fraudulent or suspicious companies. He was proud of the many threats of personal violence and of libel suits, which though numerous, never materialized. This work alone deserves grateful recognition.

Reportorial work made night labor a fixed habit and it is apparent that his ability to handle the mass of detail and to cull the truth from verbose mining reports was due to his custom of beginning work when others ended theirs and to continuing it uninterruptedly throughout the night.

Among men he was always welcome, being keen of wit, an interesting talker and ready to help friends with pen, influence or money when called upon. Though a sufferer from illness at various times, his death came without warning to himself or family; going to his office at eight o'clock at night, he reached the head of the stairway, fell and passed away.

He was a worker who fought well and long for the welfare of his country and fellow men.

THE COPPER HANDBOOK

PART I.

COPPER MINES OF NORTH AMERICA.

Including United States, Canada and Mexico.

In this volume, the descriptions of copper mines and companies have been separated into two parts, North American and Foreign. As in preceding volumes, the order is alphabetical, and in each part, is regardless of location, so that a title can be readily found. The reader is advised to consult the Geographical Index, given in Part II, to locate the properties of any locality. This section contains all companies operating in the United States, Mexico, the various provinces of Canada and Newfoundland. All others will be found in the Foreign section.

AAI MINING & MILLING CO.

IDAHO

Idle. Miné near Lewiston, Nez Perce Co., Idaho. A. B. Williams, mgr., at last accounts. Lands, 8 claims, at Wild Goose rapids, on Snake river, 35 miles above Lewiston, developed by a 400' tunnel, planned to cut, at 1,100' from portal, the main vein, showing auriferous and argentiferous copper ore, said to give average assays of \$24 per ton. Mine had several cars of smelting ore on the dump when property was shut down.

ABBEE MINING CO.

NEW MEXICO

Idle. Office: 1007 Bessemer Bldg., Pittsburgh, Pa. Mine office: Socorro, Socorro Co., N. M. Nelson Weddle, Jr., pres.; Earl A. Wheeler, vice-pres.; H. A. Spangler, treas.; J. F. Hinckley, sec.; Nathan Hall, gen. mgr., at last accounts. Organized Dec., 1901, under laws of New Mexico, with capitalization \$1,000,000, shares \$1 par. Lands, 19 claims, area 380 acres. The Abbey group, 22 miles north of Magdalena, shows 2 parallel veins with about 600' of workings, carrying ore assaying up to 40% copper and 80 oz. silver per ton. The Washington group, about 10 miles west of Upham, has a 165' shaft, shut down.

ABBOT CREEK GOLD & COPPER MG. CO.

NORTH CAROLINA

Idle. Office: Portsmouth, Va. Letters to Lexington, Davidson Co., N. C., unclaimed. W. J. Brent, mgr., at last accounts. Main shaft, 80', is in a vein carrying copper and gold, said to give average assay values of about \$15 per ton. Equipment includes a concentrator and mill with Tre-main stamps and crusher.

ABE MINING CO.

MONTANA

Idle. Mine near Wickes, Jefferson Co., Mont. E. R. Graham, supt., at last accounts. Property slightly developed, is said to show auriferous

and argentiferous copper and lead ores, developed by shaft and equipped with a small steam plant. No returns secured.

ABUNDANCIA; MINA LA.

PORTO RICO

Idle. Mine near Rio Blanca, Porto Rico, opened in 1869. Produced a small quantity of rich oxidized ore from a paystreak of 8 to 15", carrying bornite and chalcopyrite averaging 10 to 12% copper, in a vein of cupriferous pyrrhotite of 6 to 10' width.

ABUNDANCIA MINING CO., S. A.

MEXICO

Address: Puerticitos, via Cananea, Sonora. Organized May, 1912, in Mexico, by O. L. Neer of Douglas, Ariz., Apollo Fuller of Boston and W. C. Webster, Los Angeles. Property, lease and bond on the Abundancia claim, 30 hectares, 5 miles west of Cananea on west slope of mountain. Formerly held by West Cananea Mining Co. and later bonded by Copper Queen Consolidated Mining Co., relinquished 1909. Property being worked under lease by Carlos Schandelman. S. G. Burn, mgr. Shipping from 150 to 200 tons monthly of 9% ore from open cuts and tunnels. Title still held by Juan Cabral, Sr.

ACME CONS. GOLD & COPPER MINING CO.

WYOMING

Office: 85 Exchange St., Portland, Me. Mine office: Laramie, Albany Co., Wyo. Otto Gramm, pres.; L. W. Thompson, vice-pres.; Arthur S. Howe, sec.-treas. Organized May 16, 1905, under laws of Maine, capitalization \$1,000,000, shares \$1 par. Is a securities-holding corporation, controlling, through stock ownership, the Acme Gold & Copper Mining Co.

ACME GOLD & COPPER MINING CO.

WYOMING

Idle. Address: Van Horn-Miller Block, Laramie, Wyo. L. W. Thompson, pres.; Fred A. Miller, vice-pres.; Arthur S. Howe, sec.-treas. Capitalization \$400,000, shares \$4 par. Is controlled, through stock ownership, by Acme Consolidated Gold & Copper Mining Co.

Lands, 20 claims, 12 patented, area reported by company as 514 acres. also a 60-acre mill site. Property, known as the Gold Hill group, has 2,454' of workings. Improvements include necessary mine buildings, sawmill and stamp mill.

ACME MINING & REDUCTION CO.

ARIZONA

Address: 108 West Pennington St., Tucson, Pima Co., Ariz. H. H. Pilling, pres.; Adolph Bail, vice-pres.; Chas. F. Slack, treas.; Chas. W. Lewis, sec.; Lyman Bridges, mgr.; L. W. Waer, mine supt.; preceding officers and R. E. Stevens, directors; Benton Dick, resident agt.; Arizona National Bank, Tucson, depository. Organized 1907, under laws of Arizona, capitalization \$1,000,000, shares \$10 par.

Lands, the Acme group, 24 claims, unpatented, including 6 claims carrying gold, silver and lead ores; also 6 placer claims, total area 960 acres, in the Amole district, 12 miles from Tucson. Property is claimed to have orebodies of 40 to 150' width, carrying auriferous and argentiferous copper and iron sulphides giving assays of 2 to 38% copper, 2 to 6 oz. silver and \$1.40 to \$8 gold per ton. Presumably idle.

ADA COPPER MINING CO.

MONTANA

Idle. Mine office: Basin, Jefferson Co., Mont. Jas. B. White, mgr., at last accounts. Organized 1904, under laws of Montana. Property is the Ada mine and adjoining claims, carrying gold, silver and copper. Company mined a very rich orebody, which did not go down below the 100' level. Produced about \$100,000 worth of ore, shipped to Butte.

ADELAIDE STAR MINES, LTD.

NEVADA

Office: 33 Renfield St., Glasgow, Scotland. Operating office: 317 McCormick Bldg., Salt Lake City, Utah. Main office: Golconda, Humboldt Co., Nevada. P. Coats, chairman; A. P. S. Macquisten, managing

director; preceding officers, G. M. Reid and E. S. Coats, directors; D. M. Boyd, sec.; Glasgow & Western Exploration Co., Ltd., gen. mgrs.; Otto Stahlman, mgr.; Martin Iverson, supt.; Joseph Farren, mine supt.

Organized April 21, 1897, under laws of Great Britain, capitalization £350,000, shares £1 par; fully issued. Statement for year ending Oct. 31, 1911, submitted to shareholders June 21, 1912, showed debit balance increased from £422,589 to £487,956.

Lands, 780 acres, including the Adelaide group of 13 claims, area 238 acres, 10 miles south of Golconda, and the Star group of 11 claims, area 220 acres, at Cherry Creek, White Pine Co., Nev., also a 170-acre mill site. The Star mine is developed by shaft and tunnel to depth of 800'.

The Adelaide mine, opened to depth of 300', with 3,000' of workings, has a 300' shaft, and in the upper levels carried native silver, the 200' level showing a good body of medium grade auriferous and argentiferous copper ore, a carload mill test returning \$9.40 per ton. Vein is wide, carrying chalcopryite, with gangue of garnetiferous limestone. Mine equipment includes a 200-h. p. steam plant, hoist and 2 air compressors. A 12-mile narrow-gauge railway connects the mine with the mill at Golconda.

The 100-ton reduction plant includes a 30-ton sampler and treats custom ores as well as company's own production. The mill used the Macquisten flotation process of concentration, by which ore is first put through crushers, then through steel rolls, afterward through Huntington mills, then going to the Macquisten plant, which has 100 concentrator tubes, each 18" in diameter and 6' long, arranged side by side in 4 tiers. More than one-half of the tubes are immersed in water, and ore is carried through by endless screws, passing out of the tubes at surface, into settling tanks below. Concentrates not caught in the first tier of tubes pass into the next set, and so on, the process being completed in the third set. It is stated by the company that this process gives good extraction from all sulphide ores, and is especially applicable to sulphides where the gangue is of nearly the same specific gravity as the mineral. The mill closed down early Dec., 1910.

The company also has a new 25-ton mill at the Star mine, Cherry Creek, Nev. Negotiations are in progress for the sale of the property.

ADMIRAL GOLD & COPPER MINING CO. NEW MEXICO

Idle. Office: Sterling, Kan. Letters unclaimed at Tusas, Rio Arriba Co., N. M. C. A. Cooper, pres.; W. M. Bisbee, sec. Organized 1900, under laws of New Mexico, capitalization \$500,000, shares \$1 par. Lands, 5 claims, area 120 acres, in the Bromide district, showing 3 fissure veins of 10' average width, carrying sulphide ores, opened by 3 shafts, deepest 130'. Apparently moribund.

ADMIRAL MINING CO. WASHINGTON

Mine near Valley, Stevens Co., Wash., 40 miles north of Spokane. Organized 1913, with T. H. Greenway, pres.; T. R. Tate, vice-pres.; Mrs. T. R. Tate, treas., and Chas. Warsth, sec. Property developed slightly and reported to show copper-silver bearing ore at surface.

ADVANCE MINING CO. ARIZONA

Mine office: Fort Grant, Graham Co., Ariz. John W. Manning, pres.; Wm. G. Leland, vice-pres.; Schuyler S. Moore, sec.-treas. Organized 1906, under laws of West Virginia, capitalization \$300,000, shares \$1 par, as successor of Graham County Mining Co., which succeeded the Spenazuma Copper Co., a swindle promoted by the notorious Dr. Flower. Lands, 27 claims; 9 copper claims in the Black Rock district, and 18 gold claims in the Clark district. Property has about 2,600' of workings, made by former owners and said to show copper ore; claimed to have cost about \$100,000. Idle since organization, except for annual assessment work.

ADVANCE MINING CO.**IDAHO**

Office: 824 Vine St., Missoula, Mont. Mine office: Mullan, Shoshone Co., Idaho. F. D. Fox, pres.; Geo. F. Stoney, vice-pres.; Henry Hubert, sec.-treas.; preceding officers and Henry Partoll, directors; Jos. Peila, supt. Lands, 4 claims, 4 miles from Mullan, on Snowstorm hill, lying between the Snowstorm on the east and the Butte & Cœur d'Alene on the west. Development is by a 1,200' tunnel, with a drift therefrom showing streaks of chalcopyrite ore.

ADVENTURE CONSOLIDATED COPPER CO.**MICHIGAN**

Office: 32 Broadway, New York. Mine office: Greenland, Ontonagon Co., Mich. Jas. L. Bishop, pres.; Charles G. Lund, vice-pres.; W. R. Todd, sec.-treas.; preceding officers, Chas. J. Devereaux, James S. Dunstan, Chas. G. Lund and Chas. D. Hanchette, directors; W. A. O. Paul, asst. sec.-treas.; Chas. L. Lawton, gen. supt.

Organized Oct. 17, 1898, under laws of Michigan, capitalization \$2,500,000, shares \$25 par; paid in, \$23. American Loan & Trust Co., Boston, registrar; Old Colony Trust Co., Boston, transfer agt. Annual meeting, first Thursday after first Wednesday in June.

Operations, 1912, were conducted at a loss of \$38,741, and company ended year with cash assets, \$42,307, and liabilities, \$33,634. An assessment of \$1 per share was levied July 20, 1911. Aug. 6, 1913, company was reported to have \$11,000 cash on hand and \$1,835 due from unpaid assessments.

Lands include the old Adventure and Hilton tracts, in one body to the eastward, and the Knowlton tract, 1 mile S. W., with total area of 1,696 acres on the mineral belt, also a mill site on Lake Superior. The mineral lands are located in Secs. 35 and 36, T. 51 N., R. 38 W., and in Secs. 1 and 2, T. 50 N., R. 39 W. The Toltec and part of the Belt lie on the north, South Lake east, Toltec and Mass on the south, and the Mass on the west of the main tract. The Knowlton tract has the Mass to the north and east, Flint Steel to the south and Michigan to the west, the Ridge mine of the Mass lying between the two Adventure tracts. The village of Greenland lies on the northwestern corner of the Adventure's principal tract, and the village of Maple Grove, controlled by the company, is near the mine.

The old Adventure mine was opened 1850, along a line of ancient pits showing prehistoric mining. The largest annual production was 233,941 lbs. fine copper, 1857. After being closed by owners, the old openings were worked for years by tributors, proving notably rich in silver.

The Hilton, or Ohio mine, opened 1863, on the Mass lode, never was worked vigorously. The Knowlton was opened in 1853. These three old mines made 1,949,173 lbs. fine copper, previous to their merging as the Adventure Consolidated, which started work Nov. 1, 1898.

The Adventure property has a series of 7 parallel copper-bearing beds in a cross-section of about 1,200' and these, coupled with the existence of Adventure bluff, a 300' hill, caused the opening of the mine by adits, as well as by shafts. The Evergreen belt, of Ontonagon county, comprises a belt of bedded traps, amygdaloids and conglomerates, 7 of these amygdaloidal beds carrying copper on the Adventure tract. These beds were fully described, Vols. I to VII, inclusive.

The cupriferous beds of the Evergreen belt are notoriously bunchy, being rich in spots and worthless at other points. The strike of the parallel lodes of the Adventure is N. 73° E. on the main tract, where operations were conducted, shafts being sunk at an angle of 45°. The old mine has 4 tunnels and 4 shafts, latter, except No. 1, which is in the Merchant lode, being sunk on the Knowlton bed, at 45°, and numbered from west to east.

Production from the old mines ceased, Jan., 1908, since which time

only exploratory and development work has been done. From June, 1908, to Feb., 1909, diamond-drill holes aggregating 7,096' were bored, 7 drill holes being put down in the southern part of the property, in an effort to locate the Lake bed, these resulting in the disclosure of the 3 so-called Adventure beds, and giving a cross-section of the property from 500' N. of the Knowlton bed to the southern boundary. These drill borings located 3 cupriferous amygdaloidal beds, known as Nos. 1, 2 and 3 Adventure lodes. No. 1 bed, averaging about 25' width, shows copper for about 18'. No. 2 bed is approximately 300' below No. 1, with a heavy conglomerate bed lying between that and No. 1, and No. 3 is about 1,000' below No. 2.

No. 5 shaft, started May 6, 1909, is 6x16' inside measurement, with two 6x6' hoisting compartments and a 4x6' compartment for ladders and pipes. Shaft is vertical and was 1,520' deep, June, 1913. It is located about 1,500' south of No. 3 shaft, is lined with concrete for a depth of 50' from the collar, and is solidly timbered from surface. The shaft cuts No. 1 Adventure lode at depth of 894', and is expected to cut No. 2 lode at about 2,200' depth, and No. 3 at about 2,600' depth. The No. 1 lode, opened by an 80' crosscut on the 1,021' level has been drifted upon for a distance of about 200' and discloses very little copper. A 1,150' exploratory crosscut south and west on the 1,500' level intercepts 3 beds, designated as Nos. 2, 3 and 4, cutting the first at a distance of 634', the second at 880' and the third at 1,015' from the shaft. These lodes, opened by drifts out from the crosscut, are altogether without promise so far as opened, the No. 2 lode, 29' wide, and opened for a distance of 145', carrying much copper in the first 7', with the remainder practically barren; No. 3, 32' wide, and opened 547', showing varying amounts and generally poor, and No. 4, 65' wide, carrying practically no copper in the 34' drift run along the footwall of the lode. A fifth lode, No. 1½, first encountered in shaft sinking, is opened for a distance of about 130' at a depth of 1,190' in the shaft, and makes a fair showing. All work was suspended June, 1913.

The new Mass lode, so-called, lying about 120' S. E. of the Evergreen bed, was opened by test pitting, May, 1909, and some crosscutting was done from the Evergreen bed, down to the 6th level of No. 2 shaft, but only a few feet of drifting was done. This bed shows a width of 8 to 12', but carries flaky copper, with considerable epidote. No work is in progress on this bed.

The mine equipment includes a 38x59' steel boiler house with three 500-h. p. Burt boilers; a 59x59' steel engine house having an Allis-Chalmers duplex double-cone drum direct-acting hoist with 42x60" cylinders, capable of raising a 12-ton load from a depth of 5,000' on an incline of 45° at a speed of 2,000' per minute, and a 38x65' steel compressor house having a 60-drill Rand-Corliss air compressor. There is a complete electric light and power plant and protection from fire is furnished by water mains. The principal mine buildings are sheathed with steel and painted, and the property is served by a spur of the Copper Range railroad.

The stamp mill at Edgemere, on Lake Superior, went into commission Sept. 22, 1902. Equipment includes 3 Allis-Chalmers heads, fitted with Parnall-Krause mortars having 11 to 16" openings in discharge screens, with 2 horizontal revolving screens having 5 to 18" openings for each head. The stamp pistons are automatically rotated, equalizing wear on the shoes. From the revolving screens of the heads, crushed rock goes to the separator jigs, 24 for each head, or 72 for the mill, thence to 36 finisher jigs. There are round slime tables, 3 Overstrom and 3 Wilfley concentrators, and Huntington mills for raggings. Rock bins have a storage capacity of 4,500 tons. Coal is delivered from trestles to boiler rooms by gravity,

through chutes. The pump is a 16,000,000-gal. Riedler, drawing its supply from Lake Superior through a tunnel extending 1,200' under the lake. Miscellaneous improvements at the mill site include an office, smithy, machine shop, dwellings, etc.

Production has been as follows: 23,572 lbs. in 1900; 29,361 lbs. in 1901; 606,211 lbs. in 1902; 2,182,608 lbs. in 1903; 1,380,480 lbs. in 1904; 1,606,208 lbs. in 1905; 1,552,628 lbs. in 1906; 1,244,874 lbs. in 1907, with no later production.

AEOLIAN COPPER CONSOLIDATED MINING CO., LTD. IDAHO

Idle. Office and mine: Mullan, Shoshone Co., Idaho. Alfred Andrieux, pres. and mgr.; F. Enjolras, vice-pres.; Clara H. Phipps, sec.; Marguerite Andrieux, treas.; preceding officers, G. E. Phipps and Alexis Canceau, directors. Capitalization \$1,500,000, shares \$1 par.

Lands, 9 claims, 2 fractional, area 140 acres, fairly timbered, including a mill site and water right near the head of Deadman's gulch, 3 miles from Mullan, near the Lucky Calumet and west of the Snowstorm, supposedly carrying the Snowstorm ore zone. Property shows 2 well-defined veins in quartzite and porphyry, about 400' apart, south vein being 10 to 40' and north vein 4 to 10' wide. The north vein has given ores from near surface, assaying up to 22% copper, with high values in silver, and ore also has been secured assaying up to 4% copper and \$50 gold per ton. Development is by a 650' tunnel, and the long tunnel of the National mine passes through several claims.

Equipment includes a 24" Pelton wheel, a 500' flume of 8" pipe from the east fork of Deadman's creek, and a 10x12" single-stage air compressor. Buildings include an engine house, boarding house and smithy.

AETNA MINING CO.

WYOMING

Idle. Office: Merrill, Wis. Mine near Riverside, Carbon Co., Wyo. Hon. Julius Thielman, pres.; E. F. Hanf, sec. Organized under laws of Wyoming, capitalization \$1,000,000, shares \$1 par.

Lands, 7 claims, area 140 acres, in vicinity of Beaver creek, about 12 miles south of Encampment, having 4 orebodies of 3 to 6' estimated width, in fissure veins and in contact deposits between granite and quartzite. Mine has a 215' shaft with upwards of 1,000' of workings, drifts on the 100' level showing 3 ore shoots assaying up to 15% copper and \$8 to \$28 gold per ton, ores including chalcopryite, bornite, covellite and chalcocite, carrying good gold values. Mine also has tunnels of 125 and 380'. Equipment includes a 40-h. p. steam plant. Work was resumed Oct., 1909, after 5 years' idleness, and again suspended in 1910 on account of the smelter at Encampment being closed down.

AFTERTHOUGHT COPPER CO.

CALIFORNIA

Office: 400 Meridian Life Bldg., Indianapolis, Ind. Mine and works office: Ingot, Shasta Co., Cal. T. H. Adams, pres.; James E. Watson, vice-pres.; O. E. Adams, sec.; W. H. Watson, treas.; preceding officers and Geo. L. Porter, directors; S. E. Bretherton, gen. mgr.; John Bull, smelter supt.

Organized Jan., 1909, under laws of Arizona, capitalization \$8,000,000, shares \$1 par, nonassessable, in \$200,000 of 7% cumulative preferred stock and \$7,800,000 common stock; issued about \$4,200,000. Was organized as successor of Great Western Gold Co.

Lands, 19 claims, 18 patented, area 380 acres, with mill and smelter sites and timber lands giving total holdings of 1,704 acres. Lands include the Afterthought, Liberty, Last Chance, Section 15 and Bull groups, mines more or less developed being Afterthought, Copper Hill and Copper Grand. Lands are on the east side belt, which extends from Ingot to DeLamar, and is entirely distinct from the copper belt on the west side of the Sacramento

river. Lands show porphyry, slates and shales, carrying contact deposits with sulphide ores, there being 5 known orebodies, of which 2 are under development, 1 being reported by company to be 160x500x35' in size.

The Afterthought mine, in the Furnaceville district, 20 miles east of Redding, had about 2,000' of workings, when taken over by predecessor of present company, and now has shafts of 216 and 327', with 7 tunnels, main tunnel being about 2,500' long, with a total of 8,500' of workings, estimated by management to show 400,000 tons of ore, with 300,000 tons blocked out for stoping, ore being estimated to carry 2.7 to 3.4% copper, 10 to 43% zinc, a trace of lead, 6.4 oz. silver and 52 cts. gold per ton. Ore is almost exclusively chalcopyrite and sphalerite, a little oxidized ore having been shipped under former ownership. In 1905 ore smelted assayed 2.81% copper, 14.3% zinc, 11.6% iron, 20.25% sulphur, 5.3% alumina, 7.4% barium sulphate. 5.4% calcium carbonate and 18% silica. The main working tunnel cuts a 25' orebody in the Copper Hill mine.

Equipment includes a 115-h. p. steam plant at the mine, with 20-h. p. and 30-h. p. hoists and a 5-drill air compressor. Company owns a total of 55 buildings, including mine and smelter buildings, shops, dwellings, etc.

Survey was made, 1907, and work begun May, 1913, on a 14-mile standard-gauge railway, to be known as the California, Shasta & Eastern railway, to connect the mine and works at Ingot with the Southern Pacific railway at Bella Vista.

The smelter, 1 mile north of Cow creek, and 1½ miles north of the mine, connected therewith by a 30" tramline, includes a small sampling mill. The smelter, blown in March 24, 1905, has water-jacket blast furnaces of 42x96", rated at 75 tons, and 42x150", rated at 250 tons daily capacity. Fuel is coal, costing \$4.50 per ton. Smelter has 2 brick dust chambers. Much trouble was had at first with the smelter, but under the management of Mr. Bretherton, who took charge later, the furnaces were run with a low charge and an exceptionally hot top, on account of the excess of barium sulphate, this plan giving good results.

Production by the Great Western Gold Co., 1905-1907, is reported to have been upwards of \$800,000 worth of copper, silver and gold, and Mr. Bretherton states that last ore smelted, amounting to 18,951 tons, averaged 3.4% copper, 15.3% zinc, 6.4 oz. silver and 60 cts. gold per ton.

Company early in 1913 was planning to erect a reduction plant for the recovery of zinc, copper, silver and gold, leaching the zinc and recovering the copper from the residue.

AGATE HARBOR MINE.

Idle. Address: care of Mrs. Anna Scott Block, owner, 100 Washington St., Chicago, Ill. Lands, near Eagle river, Keweenaw county, Mich., were slightly prospected, many years ago, but property never was a producer.

AGNES MINING CO.

Idle. Office: Wallace, Idaho. Mine office: Saltese, Missoula Co., Mont. Chas. Buls, pres.; A. G. Kerns, sec. Capitalization \$100,000, shares 10 cts. par. Lands, 6 claims, 2 to 3 miles from a railway, near Saltese, said to show an ore zone of 60' width, carrying argentiferous lead and copper ores, with limestone gangue, developed by tunnels of 230' and 260'. Has several buildings. Stock reported valueless.

AGUASCALIENTES METAL CO.

Office and mine: Asientos, Ocampo, Aguascalientes, Mex. Charles P. Doerr, pres.; Albert Doerr, vice-pres., and mgr.; Victor Hunton, sec-treas.: D. H. Harroun, mine supt.; Jesus G. Macias, engr. Organized Dec. 31, 1900, under laws of Mexico, capitalization 35,000 pesos, shares 500 pesos par.

Land, 100 hectares, in the Asientos and Tepezala districts, including the

MICHIGAN

MONTANA

MEXICO

Merced and San Simon mines at Asientos, and a group 3 miles from Tepezala. Properties show 5 lenticular orebodies, between limestone and calcareous slate and porphyry, with silicious limestone gangue, of which 4, under development, average about 5' in width, carrying ore averaging about 3% copper, 10 oz. silver and \$2 gold per metric ton. The Merced-Orito, 8 kilometers west of Cobre station, on the Mexican Union railway, has 2 veins, of $\frac{1}{2}$ to 6 meters average width, carrying lenticular ore shoots, opened by shafts of 400' and 700', and the Porvenir tunnel, 500' long, with several miles of workings. Mine is very dry, and is lighted by incandescent lamps. The San Simon y Anexas group has tunnels of 100 and 125 meters, and a 200' shaft and the San Nicolás has a 300' shaft.

Equipment is good, including a 110-h. p. De Laval steam turbine dynamo and Cameron electric triplex pump, with 30-h. p. and 50-h. p. electric hoists, good respectively for 1,000' and 3,000'. Buildings include a 15x30' stone machine shop, 20x40' stone and adobe carpenter shop, 20x30' smithy, power house, hospital, office building, etc. Fuel is West Virginia coal, costing 18 pesos per metric ton. Average cost of mining is 10 pesos per metric ton, and of smelting 10 pesos.

Annual production, 15,000 tons ore, is sent to Aguascalientes smelter of the American Smelting & Refining Co. Mine employs about 225 men. Company is a close corporation, controlled by one family, and has been well managed, accumulating a considerable surplus. Presumably idle.

AGUASCALIENTES SMELTER

MEXICO

Owned by American Smelting & Refining Co., at Aguascalientes, Mex.

AGUILA AMALGAMATED MINING CO.

MEXICO

Idle. Office: 185 Summer St., Boston, Mass. J. Burpee Neily, pres.; John P. Burlingame, vice-pres.; Eugene N. Estes, sec.; Jas. A. Floyd, treas.; Geo. C. Tabor, mgr., at last accounts. Organized practically as a reconstruction of Mazeppa Consolidated Mining Co., capitalization \$6,000,000.

Property, near Cinco Minas, is said to have 1 shaft and 7 tunnels, with about one-half mile of workings, said to show ore giving assays of \$100 to \$160 per ton, mainly in gold and silver.

AHMEEK MINING CO.

MICHIGAN

Office: 12 Ashburton Place, Boston, Mass. Mine office: Kearsage, Keweenaw Co., Mich. Rodolphe L. Agassiz, pres.; Quincy A. Shaw, vice-pres.; Geo. A. Flagg, sec.-treas.; Clarence H. Bissell, asst. sec.-treas.; Rodolphe L. Agassiz, Quincy A. Shaw, Wm. A. Hodgson, Thomas L. Chadbourne, Jr., James McNaughton, Thos. M. Perkins and Francis L. Higginson, directors; Jas. MacNaughton, gen. mgr.; S. Russell Smith, supt.; Thos. Rapson, mg. capt.; J. T. Reeder, purch. agt.; John G. Bennetts, chief clerk. Organized March 22, 1880, under laws of Michigan and charter extended, 1910, for 30 years, capitalization \$1,250,000, shares \$25 par, fully issued; \$17 paid in. Last assessment was \$5, Feb. 5, 1904. Paid dividends of \$5 in 1911, \$15 in 1912, and \$22 to end of Sept in 1913. Annual meeting, second Tuesday in June. American Trust Co., Boston, registrar; State Street Trust Co., Boston, transfer agent. Balance of assets was \$1,013,812 at end of 1911, and \$1,379,209 at end of 1912. Is controlled by the Calumet & Hecla Mining Co., through ownership of 24,796 shares.

Lands, 931 acres, lying between the Mohawk and Allouez mines, set off, 1880, by the Seneca Mining Co., to work the Kearsage or Houghton conglomerate. Under the management of Capt. John Daniell, 2 shafts were sunk on this bed, which averages about 70' width, with 3 paystreaks of 2 to 3', aggregating 7' width, each carrying copper in good quantities, but bed not payable as a whole, owing to great width of partially or wholly barren rock. Boundary lines were rectified, by exchange of 11.18 acres with

Allouez, July, 1903, and by a similar exchange of 20 acres, with Mohawk, 1909, giving straight boundary lines on the dip of the bed, permitting easier development by all mines concerned. Work on the present mine was started Dec. 2, 1902.

The Kearsarge bed, on which the present mine is opened, ranged 14 to 18' in width, with but little poor ground encountered in the entire mine. Openings are considerably ahead of stoping requirements, and blocking out is almost entirely by drift stopes, which are carried about 9' wide and 14' high, to the boundary limits, where extraction is begun and brought backward to the shafts, thus reducing timber requirements to a minimum. The mine keeps 3,000,000 to 3,500,000 tons of stamp rock blocked out for stoping. All levels below the first are 125' apart. A Richmond electric bell signal system connects all underground workings with the engine rooms, and underground stations are connected with surface by telephone. Concrete is substituted for timber in the construction of the shafts, and in other places where practicable, rendering the shafts as nearly fireproof as possible. Mules are used in tramping rock underground.

A cross fissure vein of domeykite, copper arsenide, 71.7% copper, and mohawkite, a copper-nickel-cobalt arsenide, mainly the former, that is 4 to 12" wide, was opened 300' south of No. 1 shaft, on the 5th level, and a second vein of 2 to 12" width is found about a quarter-mile south, both crossing the bedded formation at practically right angles.

The mine has 4 shafts, numbered from south to north, planned to develop the entire tract. Nos. 1 and 2 shafts, 1,445' apart, sunk at 42°, are each 8x17' 4" in size, with 2 hoisting compartments and a ladderway. These shafts were 2,475' and 2,645' deep respectively at end of 1912. Each shaft has, between the 9th and 10th levels, a 400-ton rock bin, equipped with a measuring hopper holding exactly one 7-ton skip load, loaded in 20 seconds by one man, this system saving much time, and confining hoisting of all rock mined down to the 10th level to 1 point in the shaft. No. 1 shaft can be sunk to about 3,000' depth before cut off by the Allouez line, and No. 2 can be sunk much deeper.

The northern end of the mine is developed by shafts 3 and 4, begun August, 1908. These will command the 12 forties lying in the western half of Sec. 28 and eastern half of Sec. 29. Shafts 3 and 4, three-fourths mile N. E. of No. 2, have a common collar, being only 6' apart at surface, but diverging north and south, from the surface, at an angle of 42°. These shafts are sunk through 70' of overburden, and are concreted into the solid rock ledge for depth of 95' from surface. Owing to the outcrop of the Kearsarge lode being owned by the Mohawk, Ameeek having only the underlay at its northern end, shafts 3 and 4 are sunk in the hanging, at an angle of 80° on a plane corresponding longitudinally to the strike of the bedded formation, and bend at depth of 980', in a curve with a radius of about 400', bringing the shafts to 34°, to correspond with the rather flat dip at the Kearsarge bed, both shafts entering the bed, early 1911, at depth of about 1,275'. Concrete sets and stringers have been used in these shafts wherever ground would permit. Each shaft has 3 compartments, with two 8x8' skipways and a 4x8' ladderway. It is proposed to work out the upper portion of the bed by crosscuts, beginning at depth of 1,020' in No. 4 shaft, which will be the 1st level in these shafts, which have 3 stations above the point where the bed intersects, from which crosscuts will be run to the Kearsarge bed, to the Mohawk line. The 2 northern shafts were approximately 2,150' deep, and showing excellent copper ground at end of 1912.

Shaft houses Nos. 1 and 2 are 26x26' on the ground, and 80' high, each with a 28x100' ironclad wing over the collar of the shaft.

The main power house, between shafts 1 and 2, is in 2 parts, of brick and steel, with composition roof. Equipment of No. 1 power house includes 60-drill and 50-drill Nordberg cross-compound 2-stage air compressors, and a 32x72" cylinder Nordberg hoist. The electrical plant consists of a 13x26" Nordberg tandem-compound engine, direct-connected to a 200-kw. 250-volt Northern Electric generator. Condenser pumps and reheaters are located in the basement. No. 2 engine house is a duplicate of No. 1, containing a similar hoist with double conical drums with maximum diameter of 18' 6", capable of hoisting 10-ton skips in counterbalance from 1 mile depth. Nos. 1 and 2 engine houses are connected by a steel-frame boiler house, having six 200-h. p. boilers, with room for 8 equipped with feed pumps, ash sluices, coal trestles, etc. The boiler house has a self-supporting steel smokestack, 150' high and 7' 6" in diameter, on a sandstone-faced concrete base.

Shafts 3 and 4 are equipped with two 32x72" cylinder Nordberg hoists, a triple-expansion Nordberg compressor and electric-light engine, housed in a brick structure 65' wide by 146' long, with corrugated-iron roof; a steel boiler house 57' wide by 84' long with corrugated-iron roof, housing eight 200-h. p. boilers, and a steel self-supporting brick-lined smokestack, 7' diameter and 140' high. There is also a change house of brick construction, 39x139". A shaft rock house designed to serve both shafts is in course of erection.

The central crushing plant, of brick, is 800' north of No. 1 shaft, and 624' south of No. 2, with which the plant is connected by a temporary frame trestle 37' high and 14' wide, carrying a double track for 7-ton tram cars, which are dumped by means of cradles, and rock directed by grizzlies and chutes to the crusher, below which is a hopper, feeding directly into a shaker driven by a 7½-h. p. electric motor, crushed rock thence being fed automatically into a link-belt conveyor driven by a 35-h. p. motor, going to the rock bin. The crusher building, of steel, contains 3 Farrell crushers, driven by a 12x24" Nordberg engine, and tram cars are actuated by two 35-h. p. motors, located in the 2nd story of the building. Crushed rock goes to a 1,600-ton cylindrical steel rock bin, 32' in diameter and 48' high, set on concrete piers, with tunnel and railway track beneath, permitting the filling of cars by gravity, 1 man loading a 40-ton car in 10 seconds. Crushing costs, 1910, were only about 4½ cts. per ton.

Mine buildings include a 44x46' 2-story and basement office building, of sandstone and brick; a machine shop; a 36x160' warehouse, of structural-steel frame, connecting with railway tracks; an office for mining captains and timekeepers; smithy; 38x163' cold-storage shed, and about 70 dwellings. The location is protected by a water system having 6,000' of 6" mains with 16 Ludlow hydrants. Water is taken from an 8' dam across the outlet of Seneca lake. This water supply probably will be adequate for several years, but is located on another company's land. A large water supply could be developed from Ahmeek lands near the Allouez boundary, and an inexhaustible supply is available from Lake Superior, 4 miles distant, but about 600' lower.

The mine has rail connections with both the Mineral Range and Keeweenaw Central lines, and is connected with the mill by the Mineral Range, which enters the structure over a steel trestle 100' high.

The stamp mill, at Hubbell, on Torch lake, went into commission June, 1910. There are 4 heads, and each stamp is breaking about 560 tons of rock daily, which is expected to be increased later to 600 tons daily. The mill site has a frontage, on Torch lake, of about 2,000', with a maximum water depth of 90', providing for wasting sands for many years. Ground

was broken May, 1913, for an addition to the mill, with room for 4 heads, 2 of which are to be immediately installed, together with extensive regrinding machinery.

Several new ideas are embodied in the erection and equipment of this mill. The material of construction is steel and concrete throughout. Stamps rest on concrete piers, each standing on a concrete slab 4' 6" thick that rests directly upon a hard pan of closely-cemented gravel. Each slab holds about a mile of wire cable, interlaced upward on its surface and reaching into the pier above, which is 40x40' at the base, pyramidal in form and 38' high, giving the stamps an elevation of about 50' above lake level. There are four 1,000-ton rock bins. A new feature in local mill construction is double-deck floors, the jigs being located on the upper or roughing floor, and sands overflowing to Evans round tables and Wilfley concentrators on the ground floor. Wash equipment includes 88 jigs, 12 Evans round tables, 45 Wilfley tables and 4 sets of Woodbury jigs. Tests made, to end of 1910, indicate a saving of about one-half pound fine copper per ton from the Woodbury system of milling, over the old system. The jigs and tables are actuated exclusively by electricity.

The mill power house has six 200-h. p. boilers, with capacity to operate 4 stamps, and is the first unit of a power plant of double the present size. The self-supporting steel brick-lined smokestack is 170' high and 15' inside diameter, with capacity for a plant of double the present size. The plant has a 300-kw. generator, and a pump of 40,000,000 gal. daily capacity, capable of supplying water for 8 heads, connected with Torch lake by a 600' pipe intake.

Rock broken, 1909, amounted to 496,289 tons, with 18.2% or 90,244 tons discarded. In 1909 the company sold domeykite ore to the value of \$3,344.86. Average yield of fine copper per ton of rock stamped was 21.1 lbs. in 1908; 22.8 lbs. in 1909, and practically the same in 1910. Copper production is marketed through the United Metals Selling Co. Cost of mining, transporting and stamping, plus taxes, was \$1.78 per ton of rock in 1908, and \$1.72 per ton in 1909. Cost of production, at mine, excluding construction, was 8.97 cts. per pound and cost of stamping was 32 cts. per ton in 1908, and in 1909 these costs were 7.61 cts. per pound. Construction costs were 2.4 cts. per pound in 1908, and 5.27 cts. in 1909. Gross cost, per pound of copper, was 12.66 cts. in 1908 and 15.48 cts. in 1909 owing to unusually heavy construction cost. Total cost of all copper produced, to end of 1910, was under 14 cts. per pound, including the expenditure of upwards of \$1,500,000 on construction.

Production of finished copper has been as follows: 376,687 lbs. in 1904; 1,552,957 lbs. in 1905; 3,077,507 lbs. in 1906; 5,510,985 lbs. in 1907; 6,280,241 lbs. in 1908; 9,198,110 lbs. in 1909; 11,844,954 lbs. in 1910; 15,196,127 lbs. in 1911, and 16,455,769 lbs. in 1912.

Production for 6 months ending June 30, 1913, was 7,893,340 lbs.; the recovery was 24.5 lbs. for a tonnage of 322,551 tons ore milled, at a total cost per pound of 10.01 cts., or \$1.48 per ton. Construction work cost 2.71 cts. per ton and smelting, freight, commission, etc., 1.27 cts. per ton.

With further development and a 6-stamp mill, the Ahmeek can produce about 20,000,000 lbs. fine copper yearly, and with still further development, and an 8-stamp mill, treating 5,000 tons of rock daily, the mine should have a maximum productive capacity of nearly or quite 30,000,000 lbs. of copper yearly, and, after extraordinary construction expenses are terminated, should be able to produce copper at a total cost of between 7 and 8 cts. per pound.

AJAX MINE.**MONTANA**

Mine office: Fox, Beaverhead Co., Mont. Noyes & Morse, owners; A. L. Noyes, mgr. at last accounts. Ores carry gold, silver, lead and copper. Equipment includes a 10-stamp mill. Letters returned unclaimed, 1913.

AJO CONSOLIDATED COPPER CO.**ARIZONA**

Office: care James Phillips, Jr., 42 Rector St., New York City. James P. Gaskill, mine superintendent, Ajo, Pima Co., Ariz. Ajo claims, showing copper, are developed by 200' shaft and equipped with gasoline power. Will install power plant and concentrating mill. Employs 25 men, when operating.

A. K. R. GOLD MINING & MILLING CO.**COLORADO**

Geo. M. Ashmore, superintendent, Rollinsville, Gilpin, Co., Colo. Owns the Smuggler mine, developing a vein of copper ore with gold and silver values, opened by a 1,200' tunnel.

Equipment includes steam and electric power, an Ingersoll compressor and a 10-stamp mill.

ALABAMA MINE.**NEW MEXICO**

Mine office: Orogrande, Otero Co., N. M. W. B. Bates, lessee and mgr. at last accounts. Property, formerly held by Alabama Gold & Copper Co., was taken over, 1908, by Mr. Bates, on a \$75,000 bond and lease. Lands, 5 claims, patented, shortly south of Orogrande, formerly worked for turquoise by Tiffany & Co., and sometimes known as the Tiffany turquoise mine. The mine shows large outcrops of iron ore, and has veins carrying copper and gold values, with some turquoise. Reported reopened by leasers, 1913.

ALADDIN MINING CO.**ARIZONA**

W. A. Kent, mgr. Big Bug, Yavapai Co., Ariz. Company has 5-year lease on Paymaster mine and 8 other claims, the property of the Oriental Mining Co., in Big Bug district, near Poland. Development started April, 1913, on crosscut to tap vein. Lottie mine of same group has 4,400' tunnel and 20-stamp mill.

ALADDIN MINING CO.**MONTANA**

Mine office: Clinton, Missoula Co., Mont. J. F. Porter, supt., at last accounts. Was bonded about 1907, to Speculator Mining Co. Idle some years and apparently moribund.

ALADDIN MINING CO.**WASHINGTON**

Office and mine: Northport, Stevens Co., Wash. Frank Earnest, pres.; P. P. Swanson and C. A. Magney, directors. Mine is developed by 2 tunnels, lower 400' below upper, and management plans a third crosscut tunnel. Workings show mainly silver-lead ore, decidedly zinciferous in the upper levels. Has about 1,500' of openings in ore. Equipment includes a 50-ton concentrator and sawmill. Presumably idle.

ALAMEDA MINING CO.**WYOMING**

Idle. Formerly at Saratoga, Carbon Co., Wyo. Fully described Vol. X.

ALAMOS MINING CO.**MEXICO**

Idle. Mines are at Alamos, Sonora, Mex. Fully described in Vol. X.

ALASKA-CALUMET COPPER CO.**ALASKA**

Idle. Property in the Copper River district (under option to Benjamin Daggett, San Francisco, Cal.). Fully described in Vol. X.

ALASKA CONSOLIDATED COPPER CO.**ALASKA**

Succeeded by Alaska Copper Corporation, Nov. 1912, and property described under that title. Old company fully described in Vol. X.

ALASKA CONSOLIDATED MINING & SMELTING CO.**ALASKA**

John A. Percival, sec., Sherwood block, Duluth, Minn.; Geo. H. Crosby, pres.; A. L. Warner, vice-pres.; with Richard M. Sellwood and

Henry W. Armstrong, directors. Organized Oct. 1912, under laws of Arizona; capitalization \$2,500,000, shares \$5 par. Company purchased property of the Alaska Copper Co. at sheriff's sale and offered 100,000 shares to stockholders of the old company at \$1.25 per share. Property consists of 18 claims, 360 acres with 40 acres mill site, known as the Copper Mountain group situated on Copper Harbor, Prince of Wales Island, Alaska.

Property covers a contact metamorphic zone between granite and limestone with a porphyry intrusion along the contact. Orebodies are from 3 to 50' wide with mineralized zone 900' wide. Three lodes, the New York, San Francisco and Indiana, are recognized. Development by tunnels aggregates several thousand feet, mostly poorly directed. Engineer on ground for past year has kept a few men at work waiting for company to be financed.

Equipment includes smelter, sawmill, tramway and many buildings. Property considered valuable when developed and adequately financed.

ALASKA COPPER & COAL CO.

ALASKA

Office: 146-45 Broadway, New York, N. Y. Mine near Copper Center, Copper River district, Alaska. Organized under laws of West Virginia, capitalization \$3,500,000, shares \$10 par, as Alaska Copper Co., and name changed later to present title; capital stock decreased, May, 1910, to \$350,000, shares \$1 par. Lands, about 3,200 acres, patented, 180 miles N. E. of Valdez. The Kennecott group, formerly owned by this company, has been sold to the Kennecott Mines Co., and property is described under that title.

ALASKA COPPER CORPORATION.

ALASKA

Office: 60 Wall St., New York. Mine at Strelna, Alaska. W. F. Bay Stewart, pres.; Ambler J. Stewart, vice-pres. and treas.; Edward Barr, sec.; preceding officers, J. W. B. Bausman, Peter T. Watt, John R. Miller, Frank P. Lauer, Bülow von Ravens and Harry W. Davis, directors. Alfred B. Iles, mine supt. Organized Nov. 7, 1912, under laws of Delaware, capitalization \$10,000,000, shares \$5 par; fully paid and nonassessable; issued 1,700,000. Columbia Knickerbocker Trust Co., New York, registrar. Stock listed on New York curb. Company is a successor to the Alaska Consolidated Copper Co.

Property, 40 claims, 800 acres, final receipt issued, situated in the Copper River-Chitina district, Alaska. Holdings comprise the Nugget Creek group of 35 claims, 18 miles from Strelna station on the railroad and the Rarus group 12 miles from the railroad. Elevation of both groups about 3,500'. The Nugget group shows fissure veins in greenstone which carry both oxide and sulphide copper minerals. Development mainly on Lucky Boy and Valdez claims, shows 26' vein containing bornite and chalcopyrite in a calcite matrix averaging better than 10% copper from wall to wall, according to the manager. The parallel Copper Queen vein has an 80' tunnel cutting vein at 75' depth. Other claims have 30 to 100' tunnels. Across Nugget creek, the White Horse vein, 20' wide, carries native copper in large nuggets and masses and glance in quartz.

The Rarus group on the south bank of the Kuskulana river is 7 miles from Nugget creek. Claims cover a mineralized porphyry sheet lying between limestone and conglomerate, the vein said to be 20 to 30' thick and to be traceable 5 miles. On Rarus claim the iron capping is 300' from wall to wall. Developed by 260' tunnel in ore for 60', averaging 9.1% copper, \$2 gold, 3½ oz. silver, according to report. The gangue of the ore is decomposed porphyry and magnetite and pyrite accompany the copper ore. Property has been reported on by Prof. W. B. Clark, E. M. Wilkinson and Leon Bartholin. Management estimates 200,000 tons blocked out and

1,000,000 tons of ore in sight, carrying better than 5% copper, 5 oz. silver and \$1.50 gold. A shipment Dec. 10, 1912, of 19 tons yielded 56% copper. Property considered meritorious, but needs large amount of money for equipment and development.

ALASKA GOLD & COPPER MINING CO.

ALASKA

Idle. Mine near Iliamna, Alaska. M. T. Hart, pres., Portland, Ore.; F. E. Hart, sec. Organized 1910, under laws of Arizona, capitalization \$250,000, shares \$1 par. Lands, 3 claims, having a 300' tunnel and surface trenches. Apparently dead.

ALASKA-ILLIAMNA COPPER CO.

ALASKA

Idle. Mine address: Iliamna, Alaska. Property, near Iliamna lake, said to show a 9' vein of ore, on which a limited amount of development work has been done. Presumably dead.

ALASKA INDUSTRIAL CO.

ALASKA

Office: 115 Broadway, New York. Mine office: Sulzer, Prince of Wales Island, Alaska. A. E. Spriggs, pres.; L. A. Sarecky, sec.; Col. A. M. Lowry, treas.; Charles A. Sulzer, gen. mgr. Organized Oct. 30, 1899, under laws of New Jersey, capitalization \$1,000,000, shares \$1 par. Annual meeting, second Monday in November.

Lands, the Sulzer group of 60 claims, patented, area 1,200 acres, also 60 acres in mill sites, 80 acres in homestead, and miscellaneous properties. Eight outlying claims were leased, 1909, for 5 years, to Tyee Copper Co., Ltd. Main holdings are near the head of Hetta inlet, 2 miles from the beach and 1,500 to 2,000' above tidewater.

Mine, known as the Jumbo, has a mineralized contact metamorphic zone up to 1,000' in width, with granite foot and limestone hanging, ore fading into the lime. Property shows 7 lenses and irregular masses, ore being mainly chalcopyrite, with some bornite and a little tetrahedrite in a gangue of magnetite, garnet, epidote and other contact minerals, together with occasional molybdenite. Ore averages 4 to 5% copper, with small silver values, and \$1.50 to \$2 gold per ton.

Development is mainly by tunnel, with 4 shallow shafts and numerous open cuts. The tunnels are in series, lowest 500' vertically below the highest, all connected by winzes, and the mine has over 3 miles of workings. The Jumbo mine was operated throughout 1912, the shaft being deepened 136', and 450' of drifting done on the ore. The ore stands well, requiring little timbering, even in stopes up to 50' in width.

The property carries an available water power, rated at 5,000 h. p., and this has been partially developed by a 36" Pelton wheel, taking water from Beaver creek and actuating a 6-kw. generator, and a 16" Pelton wheel taking water under a 330' head from Jumbo creek, through a 10" pipe line of 3,000' length, this actuating a 55-kw. 3-phase 2,300-volt 60-cycle generator, current being stepped down to 220 volts for lighting and power. Mine is equipped with electric fans, blowers and Temple-Ingersoll electric drills.

A 9,000' Riblet aerial tram has 14 wooden towers with 22 half-ton buckets, operated by gravity with a 600' auxiliary tram. Capacity of tram line is 12 tons per hour. The main tram has small bins at the mine and 4,000-ton storage bins at tidewater, where there is a 200' wharf. Company has a 47' gasoline launch.

Equipment includes a Sullivan duplex air compressor, electrically driven. Buildings include a 35x40' warehouse, 30x35' power house, smithies, store, office, dwellings, bunkhouses and various smaller buildings.

Production was begun 1907, and now aggregates 100,000 tons, netting \$1,000,000. Company now shipping about 1,500 tons monthly averaging

4½% copper with small gold and silver values. Property considered valuable and management good.

ALASKA METALS CO.

ALASKA

Idle. Mine office: Bruce, Prince of Wales Island, Alaska. Harry Corbin, supt., at last accounts. Property, on the west coast of Prince of Wales Island, formerly known as the Corbin mine, is slightly developed, and a little ore has been shipped.

ALASKA UNITED COPPER EXPLORATION CO.

ALASKA

Office: 551 Coleman Bldg., Seattle, Wash. Mine office: Dan creek, Copper River district, Alaska. L. C. Dillman, pres. and gen. mgr.; Jas. A. Munday, vice-pres.; E. V. Dillman, sec.; W. A. Steele, treas.; preceding officers, H. W. Swift, Thos. M. Dunn, Frank L. Huston, Maj. F. S. Clarkson, Jas. J. O'Keane and F. M. Roessler, directors; H. D. Foster, supt; C. C. Jones, mg. engr. Organized Nov. 14, 1906, under laws of Washington, capitalization \$12,500,000, shares \$1 par. Debentures, \$150,000, 6% bonds. Annual meeting, first Monday in January.

Lands, 68 claims, area 1,360 acres, comprising the Finch, Dillman, Westover, Porcupine, Golden Eagle, Bearpaw and Snowbird groups, all 18 to 20 miles from the Copper River railroad, on branches of the Chitina and Nizina rivers, in the Copper River district, Alaska.

Exploratory work has been done on the various groups, property having a number of small tunnels and numerous trenches and opencuts, showing good copper ore. The Westover group, developed by tunnel, is estimated to have 12,000 tons ore blocked out for stoping (see Alaska-Westover Copper Co.).

The company is primarily a holding company, prospecting and developing properties in its possession for sale to other parties.

ALASKA WESTOVER COPPER CO.

ALASKA

Office: 551 Coleman Bldg., Seattle, Wash. Mine 18 miles from Copper River railroad in the Chitina district. L. C. Dillman, pres.; E. M. Kennard, vice-pres.; W. A. Mears, sec.-treas.; preceding officers, Mr. Taylor and W. F. Chandler, directors. Property, the Westover group, title to which will be transferred from the Alaska United Copper Exploration Co. in Nov., 1913. Owns 24 claims, about 440 acres, covering a contact between limestone and greenstone. The contact lies horizontally and the ore outcrop is from 6 to 14' thick and 38 to 52' long in a perpendicular bluff at 4,990' elevation. A tunnel started at the south end showed 4 to 20' of ore for 800' with a depth of 215' at the face. Ore is reported to average 24% copper, 2 oz. silver and \$1.60 gold for an average width of 12'. Ore blocked out estimated at 12,000 tons.

ALBANY COPPER CO.

NEVADA

Idle. Office and mine: Morningstar, Lyon Co., Nev. John E. Lutz, pres., treas. and gen. mgr.; E. R. Tutt, vice-pres.; Wm. G. Williamson, sec.; Ulrich Keck, supt., at last accounts. Organized June 29, 1907, under laws of Nevada, capitalization \$200,000, shares 10 cts. par, non-assessable. Annual meeting, last Tuesday in November.

Lands, 700 acres, with 400 acres miscellaneous lands, giving total holdings of 1,100 acres, 3 miles from a railroad, in the Buckskin district, showing 3 orebodies, carrying mainly nickeliferous malachite and melaconite, estimated by management to average 3.5% copper, 2% nickel, 0.2 oz. silver and \$2 gold per ton. Development includes 5 shafts, of 30', 37', 54' and 253', and 8 tunnels of 30 to 188' length, with total underground workings of 1,400'. Equipment includes a 15-h. p. gasoline hoist, good for 800' depth. Management planned deepening shaft to 500'.

ALBERT COPPER CO.**QUEBEC**

Idle many years. Office: 25 Broad St., New York. Mine office: Capelton, Sherbrooke Co., Que. Was promoted, for legal reasons, to take over the mining interests of the Nichols Copper Co. in Quebec and is controlled by that company.

The Albert mine, area 640 acres, at Capelton, carries lenses of chalcopyrite and pyrite, assaying up to 5% copper and 38% sulphur. Development is by 6 shafts, 4 under 500' depth each, with one of 800' and one of 2,000', the mine having upwards of 5 miles of workings.

The works at the Albert mine include a 150-ton concentrator, a smelter and an acid plant. The chemical works, completed, 1907, at a cost of about \$1,000,000, with capacity of 150 tons of commercial sulphuric acid daily, are among the most complete in existence, manufacturing sulphuric, nitric and hydrochloric acids and glauber salts. The cinder remaining from the burning of cupriforous pyrite for sulphuric acid is smelted in a small blast furnace, producing 1 to 2 tons daily of matte assaying up to 40% copper, with small silver contents, shipped to the Laurel Hill works for refining, and copper production is estimated at 350,000 lbs. yearly.

ALBION COPPER MINING CO.**MONTANA**

Mine near Sunday, Granite Co., Mont., but company probably defunct. Christian Reichert, pres.; Jas. M. Hinkle, sec.; Christian Jacky, mgr., at last accounts. Mine, opened by tunnels, has 3 veins, carrying auriferous and argentiferous copper and lead sulphides, of concentrating grade.

ALBION MINING CO.**UTAH**

Office: Salt Lake City, Utah. Mine office: Alta, Salt Lake Co., Utah. Wm. Hatfield, gen. mgr.; Theo. Hatfield, supt., at last accounts. The Albion group is said to have yielded about \$1,000,000 worth of ore under former ownership. Mine is developed by a 2,800' tunnel, driven to drain old workings and open new ground, showing a 6' vein, with a paystreak carrying about 40% lead and 50 to 60 oz. silver per ton, also a fissure vein carrying ore assaying up to 15% copper, with silver values.

Equipment includes water power and a 30-ton mill, with jigs, putting about 4 into 1, giving concentrates with small and variable assays in copper, 35 to 40% lead, 40 to 45 oz. silver and 0.15 oz. gold per ton. Company advertised March 29, 1910, as delinquent in payment of Utah corporation tax.

ALDER GROUP MINING & SMELTING CO.**WASHINGTON**

Idle. Mine office: Twisp, Okanogan Co., Wash. Lands, about 3 miles from Twisp, have 3 tunnels, of 3,000' aggregate length, longest said to show a 60' vein, claimed, in the press, to be solid ore, without any waste. Mine is said to have blocked out a considerable amount of silicious ore, mainly auriferous chalcopyrite. Company has shipped ore hauled 30 miles to the Columbia river.

ALEX. SCOTT MINE.**MONTANA**

Owned by Butte-Alex. Scott Copper Co., at Butte, Silver Bow Co., Mont.

ALGOMA COPPER & SMELTING CO.**ONTARIO**

Office: Prudential Bldg., Buffalo, N. Y. Mine office: Bruce Mine, Algoma, Ont. Mark B. Schwab, pres.; Eugene Warner, vice-pres.; Ben Newman, sec.; Bernard J. Hillman, treas. Organized 1905, under laws of Arizona, capitalization \$3,000,000, shares \$10 par. Lands, 1,550 acres, about 9 miles from Bruce Mine, opened by a 425' shaft and a 175' tunnel. Has a 300-ton concentrator. Property was fully described under title Rock Lake Mining Co., Ltd., Vol. III. Presumably dead.

ALGOMA CUSTOM SMELTING & REFINING CO., LTD.**ONTARIO**

Idle several years. Works office: Thessalon, Algoma, Ont. T. H. Pol-

lock, pres.; Jos. H. Pickell, sec., Utica, N. Y.; W. B. Anderson, treas. Organized Nov. 28, 1906, under laws of Ontario, capitalization \$250,000, shares \$5 par. Is closely connected in ownership and management with Hermina Mining Co., Ltd. Property is a 200-ton custom smelter, with 1 reverberatory furnace of the Swindell type, completed 1908. Smelter is not a success, and will require alteration before put in commission.

ALGOMAH MINING CO.

MICHIGAN

Office: 60 State St., Boston, Mass. Mine office: Lake Mine, Ontonagon Co., Mich. R. M. Edwards, pres. and gen. mgr.; Albert L. Wyman, sec.; Henry Tolman, treas.; R. M. Edwards, J. H. Rice, Henry Tolman, Irving J. Sturgis, S. L. Powers and Arthur C. Paine, directors; Thos. Bennetts, supt.; Wm. Wearne, mg. capt. Organized June, 1910, under laws of Michigan, capitalization \$2,500,000, shares \$25 par; issued \$1,750,000, paid in \$12. Last assessment, June 4, 1913, \$1. Of the capitalization, 60,000 shares were given land owners in full payment for property and 10,000 shares were sold to public at \$10 per share. Annual meeting, third Tuesday in April. American Trust Co., Boston, transfer agent; Federal Trust Co., Boston, registrar. Stock is listed on the Boston Stock Exchange.

The treasurer's statement, Dec. 31, 1912, showed a deficit of \$12,299, but in June company was paying off the debts with funds derived from the last assessment, which had yielded, June 13, \$15,000 out of a possible \$70,000.

Lands, 480 acres, being the N. $\frac{1}{2}$ and S. W. $\frac{1}{4}$ of Sec. 3, T. 50 N., R. 30 W. Property was owned formerly by a company of the same name, which began work 1852, and did a little prospecting, with negative results, expending about \$65,000.

An 8x12' exploratory shaft, started in an amygdaloidal bed, without definite data as to pitch, was 315' deep, June, 1913, and for the first 95' continued in vein material, passing into the hanging wall at about 95' from surface. The first level, opened at 104', has about 2,350' of drifts, and a 90' crosscut to the eastern sandstone. The second level, 212' from surface, has a crosscut northwest across the formation which, for more than 1,000', exposes almost solid trap, a small amygdaloid, 560' from the shaft, showing some native copper in about 680' of drifts. The Algoma orebody, in which the shaft is sunk, apparently has a dip of about 80° and a width ranging from about 40' at the first level to about 60' at a depth of 470', indicated by diamond-drill borings.

The Algoma bed is peculiar in both strike and contents, strike apparently being nearly north and south, in line with the strike at the Lake mine, next north, and the bed carrying copper oxide instead of native copper, as is the case with all of the other copper mines of the Lake Superior district opened on the bedded formation of the Keweenaw series. Ore is mainly black oxide, or melaconite, carrying traces of native copper, and chrysocolla of 16 to 19% assay tenor was found in a test pit near the shaft. Assays made of a small quantity of selected ore, removed in the course of shaft sinking, gave a copper value of 24.1%, this selected ore representing one-eighth of the entire body of material taken from the shaft.

Considerable diamond drilling has been done in the area west of the orebody, and to great depth, but results are conflicting and nothing definite is known concerning either the dip, strike or value of the several copper-bearing formations there encountered.

Equipment includes a steam hoist, with capacity to lift a 3-ton load from a depth of about 500', and an air compressor. Buildings include a power plant, office and boarding houses. Property considered promising and management good.

ALICANTE; COMPANIA MINERA EL.**MEXICO**

Mine office: Mazapil, Zacatecas, Mex. Geo. F. Dillon, mgr., at last accounts. Land, 18 hectares, including the Socavon Principal. Mine, developed by tunnel, has argentiferous and auriferous lead and copper ores.

ALICE CONSOLIDATED MINING CO.**UTAH**

Office: 513 Atlas Bldg., Salt Lake City, Utah. Mine office: Callao, Juab Co., Utah. W. R. Hutchinson, pres.; W. F. Calloway, vice-pres. Organized Jan., 1907, under laws of Utah, with capitalization \$1,000,000, shares \$1 par, non-assessable. Lands, 9 claims, unpatented, near the mines of the St. George Copper Mining Co., in the Dugway section 30 miles west of Tintic. The claims show auriferous and argentiferous lead and copper ores in limestone and are but slightly developed by tunnels. Idle.

ALICE COPPER & ZINC MINING CO.**NEVADA**

Mine at Good Springs, Nev. A. J. Roberts, pres.; E. B. Critchlow, vice-pres.; A. E. Thomas, sec. Property, the Alice group of 12 claims, adjoining the Yellow Pine mine on the south and in the Good Springs or Yellowpine district, 8 miles northwest of Jean, on the Salt Lake (S. P. L. A. & S. L.) railroad.

Mines are primarily zinc and lead producers from replacement deposits in limestone, copper occurring as an occasional and minor constituent.

ALICE G. MILLS CORPORATION.**COLORADO**

Mine office: Idaho Springs, Clear Creek Co., Colo. W. F. Shaffer, mgr., at last accounts. Organized 1910, as successor of Alice Development Co. Mine is opened by a tunnel, said to show a vein upwards of 75' in width, carrying ore averaging about \$4 per ton in combined copper, gold and silver values. Equipment includes a 12-stamp mill.

ALICE GOLD & SILVER MINING CO.**MONTANA**

Office: Salt Lake City, Utah. Former mine office was Butte, Silver Bow Co., Mont. John D. Ryan, pres.; Wm. D. Thornton, vice-pres.; J. W. Allen, sec.-treas.; preceding officers, Arthur C. Carson and E. S. Ferry, directors. Organized May 16, 1880, under laws of Utah, with capitalization \$10,000,000, shares \$25 par. Total dividends paid, from March 15, 1881, date of first, to March 15, 1888, date of last, were \$1,500,000. Control was purchased, 1906, by Butte Coalition Mining Co. Stockholders voted, May, 1910, by a large majority, to sell the property to the Anaconda Copper Mining Co. at the ratio of 15 shares of Alice for 1 of Anaconda, and deed to property was given May 31, 1910, the company receiving in return 30,000 shares of Anaconda stock. The Alice company is to be wound up.

The mine had a 1,500' shaft, and was operated actively, 1880-1893, and intermittently thereafter. Production, 1906, was 3,170 tons of ore, giving gross returns of \$7.70 per ton, and costing \$9.30 per ton to mine, mill and smelt.

Minority shareholders of the company were in litigation with Anaconda Copper Mining Co., 1912, to prevent dissolution proceedings and obtain a return of the property to the Alice Gold & Silver Mining Co.

ALICE MINE.**MONTANA**

Owned by Anaconda Copper Mining Co., at Butte, Silver Bow Co., Mont.

ALLAN A'DALE MINING CO.**WASHINGTON**

Probably dead. Office and mine: Chewelah, Stevens Co., Wash. Was organized about 1909, capitalization \$1,500,000, by H. S. Montgomery, T. L. Montgomery, Carl Montgomery, A. V. Montgomery, S. F. Sherwood and H. C. Hastings. Property in vicinity of Chewelah. No trace of operations secured.

ALLIANCE COPPER CO.**MONTANA**

Idle several years. Mine office: 3 Lewisohn Bldg., Butte, Silver Bow Co., Mont. Donald Campbell, pres. Organized May 19, 1906, under laws of Montana, capitalization \$400,000, fully issued, shares \$2 par. Statement of Dec. 31, 1910, gave debts of \$23,205.70. Property is very small acreage in the northeastern portion of the Butte district, with surface rights to sundry town lots. Development is by shaft, sunk jointly by the Alliance and Farrell companies, and a little ore of good grade was shipped, 1907, from the 200' level.

ALLIE ISLAND COPPER MINE.**ONTARIO**

Owned by F. W. Moore, Allie Island, Lake of the Woods, Ont. Property, 4 claims covering an outcrop of serpentine, or chlorite-schist carrying small pellets or crystals of native copper. Developed by 40 and 20' shafts showing ore in bottom. Rock is an altered diabase and mine is west of French Narrows, 14 miles from Kenora.

ALLIGATOR & TIGER LEASING CO.**COLORADO**

Mine office: Red Cliff, Eagle Co., Colo. A. S. Little, mgr., at last accounts. Lands, 2 claims, showing massive bornite and chalcopyrite, in fissure veins, traversing granite, ores assaying up to 15% copper, 5% lead, 50 oz. silver and \$10 gold per ton. No returns secured.

ALLOUEZ MINING CO.**MICHIGAN**

Office: 12 Ashburton Place, Boston, Mass. Mine office: Allouez, Keweenaw Co., Mich. Quincy A. Shaw, pres.; Rodolphe L. Agassiz, vice-pres.; Geo. A. Flagg, sec.-treas.; Jas. MacNaughton, gen. mgr; preceding officers, Harry F. Fay, W. L. Frost, F. L. Higginson and Walter Hunnewell, directors; Geo. G. Endicott, asst. sec.-treas.; F. W. Ridley, supt.; A. Warne, mg. capt. Organized Sept., 1859, under laws of Michigan, capitalization \$500,000, shares \$25 par; reorganized and reincorporated, 1889, with capitalization \$2,500,000, shares \$25 par; paid in, \$22.25. Last assessment, \$3 per share, was levied 1904. Annual meeting, second Wednesday in April. Old Colony Trust Co., Boston, registrar. American Trust Co., Boston, transfer agent. Owns a half interest in the Lake Milling, Smelting & Refining Co. Is controlled through ownership of 42,978 shares, by Calumet & Hecla Mining Co., and owes \$250,000 in notes to same company.

Lands, 3,400 acres, including the main tract of 640 acres on which the mine is opened. In 1903 exchanged 11,188 acres with Ahmeek, next north.

The old mine, opened 1859, is on the Allouez conglomerate, a bed underlying the greenstone. The conglomerate, 30' wide in many places, with strike of N. 39° E., and dip of 39°, averages 0.7 to 1% copper, and is very refractory under the stamps. There are 3 shafts, deepest about 3,700'. Mining was begun actively in 1869, and stopped in 1877, with an exhausted treasury. The mine was then leased to Watson & Walls, who made money from it, after paying a royalty of one-eighth on gross production. In 1880 the company resumed control, to quit once more, financially exhausted, in 1885. Watson & Walls took the mine again, and once more did well; the company resumed work on its own account for the third time, and again lost money, stopping all work in 1892. The old mine has been idle for some years, except for exploratory and development work in 1898 to 1900, when a shaft was sunk 1,200' on the Osceola lode, and nearly 4,000' of openings secured thereon, with indifferent results. The shafthouse at the Osceola shaft has been demolished. The old stamp mill, on Hills creek, has 3 old-fashioned heads, and is too antiquated for use. The old Allouez made 26,051,528 lbs. fine copper, 1869 to 1892.

The present Allouez mine is developed on the Kearsarge amygdaloidal bed, which does not outcrop on Allouez lands, though underlying the entire

640-acre tract, hence was opened on the underlay. The mine had but one producing shaft, until late 1909. Shafts Nos. 1 and 2 are connected by crosscuts and drift, on several levels. The Kearsarge bed, above the 14th level, is opened by crosscuts, uppermost being at the 6th level, below which plats have been cut in the shafts at the 8th, 10th and 12th levels, for crosscuts to be run to the bed. The Kearsarge bed averages about 16' width in the Allouez mine.

No. 1 shaft, at the extreme southeastern corner of the tract, with 3 compartments, started May, 1903, and 3,450' deep, leaves surface at an angle of 75°, but at slight depth takes an angle of 80°, continuing thereon to about 1,435' depth, when a curve of 60' brings the shaft to an angle of 38° 30', which is the dip of the bed. At the change of angle, on reaching the bed, a single idler with a very wide flange cares for the cables passing at either end. Owing to the steep pitch of the shaft, back rails of 6x10" timber are set so close to the wheels of the skips that their flanges cannot leave the steel rails, the wooden timbers serving as guides. The first level is opened at depth of 1,264'. In order to save pumping charges on surface water, a gutter, cut entirely around the shaft, leads to an incline 36' long, used as a sump. This shaft showed very fine ground in its upper levels, but deeper openings are not so good. Equipment at No. 1 shaft includes a 42x62" steel shaft rock house having two 18x34" crushers.

No. 2 shaft, 1,500' northeast of No. 1, is similar to No. 1 in general design, but changes pitch when entering the bed at 2,307' from surface, from 80 to 42°. The bed above the point of intersection will be reached, to the boundary, by crosscuts. This shaft is sunk further in the hanging than No. 1, owing to the proximity of a lake. A new record in shaft sinking was established, 1908, at No. 2, when, with 2 drills, the shaft was sunk a total of 1,275', in addition to which 4 plats were cut, and 105' of crosscutting was done. The collar of No. 2 shaft is of concrete, Washington fir and 16x24" steel I beams, with 14x14" square timber wall plats and 4" plank sheathing. The interior, from collar to solid rock ledge, is lined with 22" of concrete, dividers having their ends bedded in concrete, this giving an impregnable shaft, sunk through 52' of treacherous quicksand overburden. Both shafts can be sunk to about 9,400' before reaching the western boundary line. No. 2 shaft was 3,385' deep, March, 1913.

Machinery equipment includes a Nordberg hoist with 32x72" duplex cylinders and 18' double-conical drum for No. 1 shaft, and No. 2 has a 20x30" engine good for depth of 5,000'. No. 1 engine house, of mine rock, with redstone trimmings, has 12-drill and 18-drill air compressors, and No. 2 engine house has a 60-drill Laidlaw-Dunn-Gordon air compressor. The stone boiler house has five 125-h. p. boilers and a 120' self-supporting steel smoke-stack. Buildings include a redstone machine shop and smithy, and a large warehouse. There is a very considerable mine location, with numerous dwellings, some remaining from 40 years ago, and some new. The mine is reached by a spur of the Mineral Range railroad.

Rock stamped, 1912, was 333,618 tons, costing \$1.61 per ton, and yielding 16.56 lbs. fine copper per ton, giving 5,525,455 lbs. fine copper, at a total cost of 13.52 cts. per lb. Rock discarded was 6,352 tons, or about 1.87% of amount broken. Production by years has been as follows: 1906, 3,486,000 lbs.; 1907, 2,934,116 lbs.; 1908, 3,047,051 lbs.; 1909, 4,031,532 lbs.; 1910, 4,655,702 lbs.; 1911, 4,780,494 lbs.; 1912, 5,525,455 lbs. For 6 months ending June, 1913, mine produced 3,510,000 lbs. fine copper at a cost of 10.93 cts. per lb.; net profit, \$151,500.

The Allouez, a considerable disappointment in earlier years, earned a net profit of \$171,264 in 1912, turning a deficit of \$77,700 of former years into

balance of assets of \$93,564 over all liabilities, and early in 1913 was making net profits of about \$30,000 monthly on 15% copper. It is regarded as a good investment.

ALLPORT MINING CO.

MONTANA

Mine office: Basin, Jefferson Co., Mont. Capitalization \$500,000, shares \$1 par. Presumably idle.

ALMA COPPER MINING CO.

MEXICO

Mine near Carbo, Sonora, Mex. Lands, 747 acres, in the Ures district, showing auriferous, argentiferous and somewhat bismuthiferous cuprite, melaconite, azurite, malachite and chrysocolla, assaying up to 37% copper and \$13 gold per ton. Has gasoline power. Idle since about 1905, and moribund.

ALMA GOLD MINING CO.

COLORADO

Office and mine: Idaho Springs, Clear Creek Co., Colo. Theo. Mixsell, mgr. Ores carry gold, silver and copper. Has steam power.

ALMEDA CONSOLIDATED MINES CO.

OREGON

Office: 207 Board of Trade, Portland, Ore. Mine office: Galice, Josephine Co., Ore. O. M. Crouch, pres.; L. B. Simons, vice-pres.; R. C. Kinney, sec.-treas.; John F. Wickham, gen. mgr.; P. B. Geer, mine supt. Organized July 18, 1905, under laws of Oregon, capitalization \$15,000,000, shares \$5 par, as successor of Almeda Mining Co. Annual meeting, second Tuesday in December.

Lands, 17 claims, area 340 acres, also 500 acres of placer ground, in Josephine county, about 22 miles northwest of Grant's Pass, 17 miles from Merlin, nearest railway station, on the Southern Pacific, with daily stage line to Galice. Lands include a 200-acre platted town site, connected with the mine workings by bridge. Lands are well timbered, and have a considerable water power available from the Rogue river. Quartz claims are in 4 groups, known as the Almeda or North Side, Rocky Gulch, which is a continuation of the Almeda, and sometimes known as the Big Yank, both on the north side of the Rogue river, and the Bull Pine and Rand groups on the southern side of the river. Property was worked to slight depth, 1850-1870, for gold.

The Almeda group, including the Rocky Gulch, has 3 claims and 30 acres of placer ground, with 300' of tunnels, showing a strong orebody, of 40 to 60' width, with diorite foot and slate hanging, carrying 10 to 20' of ore on the hanging, ore being strongly auriferous and slightly argentiferous chalcopryite. While ore values are not high, they seem fairly constant and dependable, and the orebody is large. Paralleling the main vein is a body of low-grade ore of 20 to 30' width, highly silicious, mainly chalcopryite, with occasional bornite, giving promise of greater values at increased depth. Development is by tunnels, the longest being the Riverside tunnel having a back of about 250', and No. 1 tunnel a back of about 500', and by the Almeda 300' vertical shaft, planned to be sunk to 500'. Mine has about 1 mile of workings, with considerable ore blocked out for production.

The Bull Pine group, of 2 quartz claims, 4 miles southwest of the Rocky Gulch group, has a 100' crosscut tunnel, intersecting a 3' vein. The Rand group of 7 claims, with 500 acres of placer ground, has a 900' tunnel, the outcrop giving small-assay values in copper, silver and gold.

Equipment includes a 24-drill air compressor, and company has made plans for a steel and concrete dam, the Rogue river being estimated as capable of developing up to 8,000-h. p., under a 20' head.

Buildings include a boarding house, bunk house, office, laboratory, smithy, and a number of dwellings. There also is a 15,000' sawmill.

The 16-mile mountain road, from Merlin to Galice, is not in the best

of condition during the wet season, and company plans a motor line, with improved roads.

A smelter, completed 1910, was in operation July, 1912, after a winter's shutdown, and overhauling while roads were bad. The plant has a 100-ton 36x72" blast furnace, for matting. The 80x110' smelter building covers the power plant and ore crusher also, and is planned for an additional 100-ton furnace. The coke bins are at Merlin. Company has made a contract with the government, by which it is to pay for damage to trees and vegetation, the smelter being within the limits of a national forest reserve.

Company was thrown into hands of receiver, June, 1912, on the representation of minority stockholders that company had been mismanaged and that misrepresentations had been made in the sale of the stock. Robert S. Tucker, Portland, Ore., receiver.

ALMOLOYA Y ANEXAS; CIA DE.

MEXICO

Pedro Suinaga, pres.; P. A. Babb, cons. engr.; M. M. Barney, mgr. Organized under laws of Mexico, 1909, capitalization 200,000 pesos. Property the Almoloya copper mine at Ameca, Jalisco, containing veins in diorite said to average 2.5% copper, 2 oz. silver and a few grams in gold. Company began operations 1910, erected a concentrating plant with Merrill stamps and 3 Wilfley tables handling 30 tons per day and saving 75% of the copper and 25% of the silver values. Was a steady shipper of concentrates throughout 1910 and 1911 and paid dividends of 3,000 pesos in 1910.

The Cerritos copper mine was held under option for 50,000 pesos until 1912 and was developed by a shaft 300' deep equipped with hoist, pumps and steam power.

Mill enlarged to double capacity 1912 and run steadily.

ALMOLOYA MINING CO.

MEXICO

Office: 19 Cedar St., New York. Mine office: Baca, Chihuahua, Mex. Nils O. Bagge, pres.; M. L. Graff, vice-pres.; C. E. Bernhard, sec.-treas.; preceding officers, W. C. Patterson and I. B. Newton, directors; Victor C. Joslyn, mine mgr. Organized 1903, under laws of Arizona, capitalization \$2,000,000, shares \$1 par, in \$800,000 participating noncumulative 10% preferred stock, and \$1,200,000 common stock. New York Trust Co., registrar. Holds title to lands through Minas de Almoloya, S. A., a Mexican corporation.

Lands, 177 hectares, including the San Enrique group adjoining the Cigarrero mine, and 4 other groups, about 4 miles from Baca, in the Allende district, with rail transportation over a standard-gauge line to the Cigarrero mine.

The Sierra de Almoloya is an isolated mountain range, about 9 miles long and 2 wide, carrying limestone beds of the Comanche series of the Lower Cretaceous, extensively fractured by several systems of faulting, with shear zones of 50 to 90 meters width, principal zones being the northeast system, of Eocene age, of which the most prominent is the San Pedro fault zone, and the N. 40° W. system of Miocene age, which are the sources of large and rich ore chambers, the most important orebodies occurring at the intersection of these faults. Lands adjoin the Cigarrero mine on the northeast, and carry the extension of the San Pedro fault, proven by diamond drilling to occur between the 800' and 900' levels.

Development includes a number of shafts, deepest 700', and tunnels of 180', 360', 1,320' and 1,600'. Present development is confined to the San Enrique and Exploradora groups, having 1,186' of shafts and winzes, with 2 main and several shorter tunnels, and a total of 4,400' of workings.

Equipment includes gasoline and air power, with one 15-h. p. and two

60-l. p. hoists. Property will use commercial electric current as soon as available.

Ore so far found has been in pockets, in leached shear zones, carrying low copper values, which are expected to increase at depth, with about 30% lead, 700 grams silver and 8 to 80 grams gold.

Development work has been almost entirely along the San Pedro fault which shows ore in depth. Revolutionists practically stopped all work in 1913, holding the superintendent for ransom in April and practically stopping mail and telegraphic service. Work will be resumed when conditions are again stable.

ALPENA COPPER MINING CO.

MONTANA

Office: Wallace, Idaho. Mine office: Saltese, Missoula Co., Mont. C. W. Beale, pres.; Timothy Kelly, vice-pres. and mgr.; A. H. Featherstone, sec.-treas.; preceding officers, Alex. Muir and A. P. Cochrane, directors. Mine in the St. Joe district, near the Monitor, and 2 miles from the Adair on the Milwaukee railroad, is developed by 2 long tunnels and shaft, showing chalcopryite assaying up to 34% copper, with small silver and gold values. Continued development throughout 1911 and 1912, main tunnel being 1,100' long, of which 800' is drifting on 2' vein, showing quartz with chalcopryite. In April, 1913, face was 400' from ore shoot exposed on surface, which is goal of present work. Equipment includes several buildings.

ALPHA COPPER CO.

NEW JERSEY

Owned 1,200 acres on Watchung mountain, 3 miles north of Somerville, which were sold for delinquent mortgage of \$315,000 and a second of \$2,500, for the sum of \$5,000 on June 20, 1912, to Geo. H. Gardner of New York city. Company has no holdings and is practically dead. Described fully Vol. X.

ALPHA MINING CO.

ALASKA

Idle several years. Office: Grand Rapids, Mich. Mine office: Dolomi, Prince of Wales Island, Alaska. F. L. Loomis, supt., at last accounts. Lands, 3 claims, showing a 5' orebody traceable about 2,500', giving assays of 2.5 to 7% copper and \$3 to \$20 gold per ton.

ALPS MINING CO.

COLORADO

Office: 815 Logan St., Denver, Colo. Mine office: Central City, Gilpin Co., Colo. Property, the Alps mine, leased to Jas. Williams, at last accounts. Has auriferous and argentiferous copper ore, steam power and employed about 20 men, 1911.

ALTA CENTRAL COPPER CO.

ARIZONA

Idle. Mine office: Florence, Pinal Co., Ariz. Julian P. Jones, pres.; A. R. Hueth, vice-pres. and sec.; Citizens National Bank of Los Angeles, treas.; Col. G. W. Griffey, mine supt. Organized April 3, 1907, under laws of Arizona, capitalization \$500,000, shares \$1 par.

Lands, 7 claims, area 125 acres, carrying about one-half mile of the strike of a system of 5 fissure veins, having a north and south trend, in a width of about 1 mile, passing through Mineral hill. The Alta Mining & Smelting Co. lies to the north, and the Oklahoma to the south. Country rock is Pinal schist, intruded by porphyry dikes, the 5 fissure veins cutting the schist unconformably with strike or dip, sometimes cutting the porphyry dikes and occasionally running beside them. The veins outcrop 20 to 50' in width. Several prospect tunnels and shafts show 1 to 6' of ore carrying copper carbonates, oxides, and chalcocite, with gangue of quartz and mangiferous iron ore, carrying combined gold and silver values of \$1 to \$14 per ton. Geological conditions are said to be markedly similar to those at the Gibson and Live Oak mines, distant about 20 miles to the northeast.

Company planned developing through a drift, to be run from the 400' level or the main shaft of the Alta Mining & Smelting Co.

ALTA COALITION COPPER CO.

UTAH

Probably dead. Formerly at Brighton, Salt Lake Co., Utah. F. R. Snow, pres.; B. F. Grant, vice-pres.; N. Y. Stringham, sec. Organized, early 1907, to develop a group of claims in the Big Cottonwood district. Advertised 1910 as delinquent in payment of corporation tax in Utah.

ALTA CONSOLIDATED MINING CO.

UTAH

Office: 201 Judge Bldg., Salt Lake City, Utah. Mine office: Alta, Salt Lake Co., Utah. Tony Jacobson, pres.; J. H. Winwood, E. M., vice-pres.; M. J. Dailey, mgr.; A. O. Jacobson, supt. Foregoing are all directors; V. S. Snow, sec.-treas. Organized Aug., 1911, capitalization \$300,000, shares \$1 par, the promoters taking 100,000 shares and 200,000 shares being placed in the treasury of which amount 100,000 shares were sold at 20 cts. per share; capitalization was increased Oct. 10, 1913, to \$500,000, to provide stock for treasury purposes.

Lands, 17 claims in the Little Cottonwood district, lie between the old Emma and the City Rocks properties, and include several old mines. Ores are argentiferous lead and copper sulphides, and highly argentiferous lead carbonates, returning 5% copper, 15% lead, and 75 oz. silver per ton, with 27% lead and 56 oz. silver per ton secured from lead carbonates in 1912. Mine is developed by tunnels, the main crosscut tunnel, 300' below the Brooklyn, cutting the Bain fissure 900' from the portal, exposing 18 to 20' of shipping ore. A raise on bedding planes yields ore carrying 1 to 2% copper, 20% lead and 30 oz. silver. Mine has virgin ground and 2,000' of new openings, 1913.

Equipment includes gasoline power, and necessary mine buildings. Employs about 25 men. Shipments were made during summer of 1913.

ALTA COPPER MINING CO.

IDAHO

Idle. Office: 6 West Second South St., Salt Lake City, Utah. Mine office: Mackay, Custer Co., Idaho. Frank M. Foote, pres.; Ernest R. Woolley, vice-pres. and mgr.; Fred R. Woolley, sec.-treas.; H. C. Parker, cons. engr.; L. S. Rampton, supt., at last accounts. Organized 1908, under laws of Utah, capitalization \$1,000,000, shares \$1 par; issued, \$600,000. Is a close corporation.

Lands, 7 claims, well timbered and watered, 22 miles from a railroad, including several good water rights on Lost river. Development is by 2 tunnels, the 250' upper tunnel showing a vein up to 14' in width, carrying a 2' paystreak of high-grade argentiferous copper and lead ore, and lower tunnel is said to show a 7' vein carrying auriferous and argentiferous lead and copper ore, mainly of smelting grade. Has secured ore assaying up to 174 oz. silver and 1.02 oz. gold per ton. Employed 12 men, end of 1908.

ALTA-CORBIN COPPER CO.

MONTANA

Mine near Corbin, Jefferson Co., Mont. Organized Jan., 1909, capitalization \$1,000,000. Lands, 4 claims, known as the Flambeau group. No trace of operations secured.

ALTA-IDAHO GOLD & COPPER MINING CO.

IDAHO

Office: Bloomsburg, Pa. Mine office: Pardee, Idaho Co., Idaho. J. B. Nuss, pres.; Geo. M. Snyder, vice-pres. and gen. mgr.; John M. Nuss, sec.; Richard A. Briggs, treas. Organized Dec., 1902, under laws of Delaware, capitalization \$1,000,000, shares \$1 par, in \$250,000 of 8% noncumulative preferred stock and \$750,000 common stock. Delaware Trust Co., Wilmington, Del., registrar and transfer agent. Idle many years, except for annual assessment work.

Lands, 11 claims, area 209 acres, and a 5-acre smelter site, in the Lolo

district. Mine has several shallow pits and shafts, and has projected an 1,800' crosscut tunnel, with about 475' completed, showing stringers of oxidized ores, and several small lenses of highly auriferous chalcocopyrite of good copper tenor.

ALTA MINING & SMELTING CO.

ARIZONA

Idle. Address: Florence, Pinal Co., Ariz. L. H. Sherman, pres.; Col. G. W. Griffey, vice-pres. and agent; H. A. Austin, second vice-pres.; J. C. Ferrall, sec.-treas.; preceding officers and G. R. Charters, directors. Organized Sept. 8, 1905, under laws of Arizona, capitalization \$5,000,000, shares \$1 par. Annual meeting, first Tuesday in September.

Lands, 25 claims, area 470 acres, and a 200-acre patented ranch, including a water right on the Gila river, in the Mineral Creek district, at Superior P. O., near the Lake Superior & Arizona mine. Lands have veins in schist and contact deposits between schist and porphyry, ranging 5 to 50' in width, opened by shafts of 96', 127' and 150', with upwards of 3,000' of workings, showing ore giving assays of 2 to 57% copper, with gold and silver values, also a lead vein giving assays of 2 to 57% lead, 4 to 15 oz. silver and 80 cts. to \$14 gold per ton.

Equipment at the Black Copper shaft includes boiler house and power house, with steam hoist good for 1,000', 4-drill Leyner air compressor and 14,000-gal. oil tanks. There are 9 mine buildings.

A suit against H. W. Augustine, H. F. Clough and I. A. Wood, promoters, for money claimed to be illegally appropriated for their own use, was decided in favor of the present management, compromised by the surrender of 1,190,000 shares of stock to the company.

ALTA-PERUVIAN MINING & MILLING CO.

UTAH

Office: Springville, Utah. Mine near Alta, Salt Lake Co., Utah. F. J. McAuliffe, pres.; M. W. Bird, sec.-treas. Organized 1904, capitalization \$50,000, shares 5 cts. par, non-assessable; issued, \$440,000. Assessments to end of 1910 were 2 cts. per share. Lands, 4 claims, in Little Cottonwood cañon, near the Columbus Consolidated, developed by tunnels of 100 and 150', upper tunnel showing argentiferous copper ore. Works during summer months and is idle winters.

ALTA TUNNEL & TRANSPORTATION CO.

UTAH

Office: 501 Newhouse Blk., Salt Lake City, Utah. F. V. Bodfish, pres. and mgr.; Jas. Owen, vice-pres.; John Cain, sec.; preceding officers, Chas. Peter and Geo. H. Rathman, directors; R. L. Mack, cons. engr. Organized Sept. 1911, under laws of Utah, capitalization \$1,000,000, shares \$1 par, 700,000 issued.

Lands, 14 lode claims, include the old Alta tunnel ground. Company is driving a mile-long drainage and transportation tunnel (300' long, July, 1913) to open its own and adjoining properties, with portal 3,500' from Silver fork on the Big Cottonwood, and 8,500' above sea level. Equipped with 50-h. p. motor and compressor. Tunnel will be 600' lower than any mine workings of the district and will cut all the great veins of the section.

ALTA-ZOANNI MINING CO.

NEVADA

Probably idle. Mine office: Hamilton, White Pine Co., Nev. Roy W. Schenk, pres. and gen. mgr.; M. T. Collins, vice-pres.; G. A. McElery, sec.-treas. Lands are near the peak of White Pine mountain.

ALTAMIRA MINING CO.

MEXICO

Mine near Ahualulco, Jalisco, Mex. W. W. Matthews, pres.; W. G. Farleigh, supt., at last accounts. Property is said to be controlled, through stock ownership, by the Jalisco Mining Development Co. Idle several years and letter sent to Etzatlan returned, marked "no existe."

ALTAMONT MILLING CO.**NEW MEXICO**

Idle. Office: Altamont, Ills. Capt. L. H. Williams, pres. Lands include the Cuprite mine, having a 140' shaft, said to show 12' of medium-grade chalcopryrite, with limestone gangue. A small smelter shipment from the 80' level gave net returns of \$8 per ton.

ALVIN DEVELOPMENT CO.**ARIZONA**

Office: Houghton, Mich. Controlled by Tank Pass Consolidated Mining Co., Salome, Yuma Co., Ariz. Temporarily idle except for annual assessment work. Described Vol. X.

ALYCE MINERAL CO.**GEORGIA**

Mine office: Wells, Murray Co., Georgia. J. G. Sterchi, pres.; Joe P. Davis, vice-pres.; W. D. Haun, Gus N. Miller and N. S. King, directors. Lands are several thousand acres, about 30 miles southwest of the Ducktown mines of Tennessee, showing argentiferous and auriferous lead and copper ores. Apparently no development work undertaken. No returns secured.

AMADOR CONS. MINING & DEVELOPMENT CO.**MONTANA**

In bankruptcy at last accounts. P. F. Smith, receiver. Organized March 16, 1903, under laws of Arizona, with capitalization \$10,000,000; shares \$5 par. Owned entire stock issue of the Amador Copper & Gold Mining & Milling Co., but latter is alive while this company is apparently dead.

The Amador, promoted by D. E. McKinnon, was in four parts, this corporation being the holding company, with subsidiaries known as Amador Copper & Gold Mining & Milling Co., Ltd., Amador Railway Co., and Amador Smelting Co., each having full lists of officers, apparently drawing salary. Shares originally were non-assessable. See other titles. More fully described Vol. VIII.

AMADOR COPPER & GOLD M. & M. CO., LTD.**MONTANA**

Office: 510 Bank St., Wallace, Idaho. Mine office: Iron Mountain, Missoula Co., Mont. R. G. McIntosh, pres.; A. T. Roan, vice-pres.; A. L. Nicholson, sec.-treas.; preceding officers and P. F. Smith, directors. Organized under laws of Arizona, capitalization \$2,000,000, shares \$1 par. Stock assessable, and a levy of 1 ct. a share was made delinquent Jan. 28, 1911. A special stockholders' meeting was called for June 14, 1913, at Wallace. Entire stock issued formerly was held by Amador Consolidated Mining & Development Co., hopelessly bankrupt.

Lands, 8 patented claims, 11 miles south of Iron Mountain, Mont. Also 2 groups of patented placer gold claims, area 180 acres and 450 acres miscellaneous lands.

Mine has a 700' vertical, 3-compartment shaft, with levels at 200', 460' and 700', and long drifts on each level. There are also 4 tunnels of 187', 512', 632' and 662'. The mine shows a small shoot of fair-grade ore, ore occurring in small bunches, very irregularly, with calcite gangue, in black slate.

Equipment includes a 2-mile flume and pipe line, delivering water under a 310' head, and steam power, with 2 hoists, air compressor, sawmill, and about 15 mine buildings. Production, under D. E. McKinnon's management, was 5 carloads of ore, which did not pay for treatment charges.

The present management apparently bid in this property at sheriff's sale for \$7,297.84, and reorganized the property and put it on a decent basis, the work of reorganization being much hampered by the great confusion into which McKinnon threw this and its allied corporations by his devious methods of high finance.

Company made shipments of high-grade ore in 1912. Equipment is far

ahead of company's needs and property is not yet far enough developed to be a self-sustaining mine.

AMADOR SMELTING CO. MONTANA

Is a subsidiary of Amador Consolidated Mining & Development Co., adjudged bankrupt.

AMALGAMATED COPPER CO. MONTANA

Office: 42 Broadway, New York, N. Y. Mine office: Butte, Silver Bow Co., Mont. John D. Ryan, pres.; William G. Rockefeller, Benj. B. Thayer, Wm. Rockefeller, J. Horace Harding, H. H. Rogers, A. C. Burrage and Chas. N. King, directors; A. H. Melin, sec.-treas. Organized April 27, 1899, under laws of New Jersey, capitalization \$75,000,000, increased, 1901, to \$155,000,000, shares \$100 par; issued, \$153,887,900. Central Trust Co., New York, and National Shawmut Bank, Boston, registrars. National City Bank, New York, and Kidder, Peabody & Co., Boston, transfer agents. Annual meeting, first Monday in June. Company has about 17,000 shareholders. Stock is listed on New York and Boston stock exchanges.

Notes for \$12,500,000, 5% due March, 1915, are outstanding, but subject to redemption at 101 and interest on 3 weeks' notice, the company agreeing that no mortgage be placed upon the property and no other notes issued so long as any of these notes remain unpaid.

Net income reported by company was as follows, for fiscal years ending April 30: \$14,154,400 in 1907; \$6,680,557 in 1908; \$3,663,980 in 1909; \$5,963,967 in 1910; \$6,048,896 in 1911, and for the 8 months ending Dec. 31, 1912, \$6,595,610.

Fiscal year was changed, 1912, to correspond with calendar year, and surplus, Dec. 31, 1912, was \$24,000,614, with cash \$1,182,881, assets other than cash, \$14,500,535, and accounts and notes payable, \$20,264,111.

Dividends have ranged yearly from a minimum of \$2 to a maximum of \$8, latter in 1900, the second year of operation, when dividends were \$10,500,000. To end of 1912, dividends aggregated \$72,812,660. Dividend returns have averaged since organization about 6% on the market price of the stock.

Production, 1912, by mines controlled by the company was 294,474,161 lbs. fine copper; 11,014,736 oz. silver, and 61,314 oz. gold.

The Amalgamated is now simply a holding corporation, not a mining company. Assets formerly consisted of ownerships, ranging from a mere control, to practically the entire stock issue, of the Anaconda, Boston & Montana and allied mines in Butte, all of which were merged, 1910, in the Anaconda Copper Mining Co., which also took over the property of the Butte Coalition, Alice, Original and Colusa-Parrot companies. By reason of this merger, the Amalgamated becomes merely a holding company for a single corporation, the Anaconda Copper Mining Co. The Amalgamated Copper Co. owns 3,185,802 shares, out of 4,332,500 shares outstanding, of the Anaconda Copper Mining Co., an interest of about 73%. No detailed inventory of assets is given in the company's 1912 report but it is figured out that at the end of 1912 the company owned besides its Anaconda stock, 154,000 shares Greene-Cananea, 43,000 International Smelting & Refining Co., 150,000 shares Inspiration Consolidated, \$1,000,000 bonds of Butte Anaconda & Pacific railroad; \$110,700 (out of \$111,000) capital stock of the Mountain Trading Co.; the entire capital stock of the United Metals Selling Co., and \$15,683,417 in cash and cash assets; a total net value, May, 1913, when stock prices were abnormally low, of \$121,059,857, or about \$78½ per share for the stock issued. Besides these holdings its selling contracts must bring in a good revenue.

The Amalgamated Copper Co., organized in 1899, immediately became

an important factor in the copper industry, controlling the bulk of the copper produced by the various mines of Butte, Mont. Troublesome and costly litigation at Butte was settled, 1906, through the formation of the Butte Coalition Mining Co., which eliminated the almost intolerable conditions due to the "apex law" which had existed for years, through the activity of F. Augustus Heinze, who was thus no longer a factor either in the Butte camp or in the copper situation.

The company has made especially notable progress since 1904, when the new managing director inaugurated important changes in the policy of the corporation. The Amalgamated does not control the copper industry and does not seem likely to ever do so. So far as an outsider can judge it appears to be a useful balance wheel in steadying copper prices and seemingly is a party to a rapprochement of all the leading copper-producing interests of North America and Europe, a "Gentlemen's agreement" which has done much to prevent violent fluctuations in either price or output since August, 1910.

Despite popular belief that the Amalgamated Copper Co. and the Anaconda Copper Co. control the industries of Montana, we are told that the corporations own no interest in any commercial business outside of their mines, mills and smelters, with the following exceptions: They own a hardware and machinery store at Anaconda, a hotel at Anaconda, and a general supply store at Belt. They disclaim any interest in the stores, light and power plants, etc., often called "Amalgamated," but the lighting and street railway business in Anaconda is still owned by this company. With the exceptions noted, the copper corporation has disposed to outside parties of every business it was in any way connected with except those directly associated with the mining, smelting and making of copper.

The Great Falls Power Co. and the Great Falls Townsite Co. are frequently referred to as Amalgamated Copper Co. properties, but we are told that neither the Anaconda Copper Mining Co., nor the Amalgamated Copper Co., or any of the subsidiary copper companies, or any of their principal stockholders, with the exception of Mrs. Margaret Daly and John D. Ryan, own any shares in the Great Falls Water Power Co., or any other power company in Montana. This statement is substantially true also as regards the ownership of the Townsite Co., the New Rainbow hotel and other properties often classed as owned by the Amalgamated Copper Co., or identical interests.

It is to be noted that in 1912 the number of employees was 13,941 and the total wages paid to these men was \$16,818,284; this comes to an average wage of over \$1,200 per year for the whole force. The figures are astonishing. We doubt if any corporation in the United States employing an equal number of men pays as high an average wage.

Though once regarded as overcapitalized, the company has prospered, under the wise administration of its present head, until it may be said to fulfill all the hopes of its most ardent friends.

AMALGAMATED GOLD, COPPER & SILVER CO.

ARIZONA

Office: 3 South Main St., Sapulpa, Okla. Mine office: Florence, Pinal Co., Ariz. W. A. Borah, pres.; Robt. M. Nicholas, treas.; W. M. Longmire, sec. Organized 1911, under laws of Arizona, as successor of Oklahoma Copper Co.

Lands, 25 claims, unpatented, area 500 acres, next south of the Alta Central Copper Co., in the Mineral Hill district, said to show 5 orebodies, of which one, under development, of 10' claimed width, said to be traceable $2\frac{1}{2}$ miles, is estimated by company to average 3% copper and \$2 gold per ton, from oxidized ores and chalcopryite. Development is by 8 pits and

shafts, of 20 to 200' depth, and by a 50' tunnel. Idle except for annual assessment work.

AMAZON-DIXIE MINING CO.

MONTANA

Office: Wallace, Idaho. Mine office: Mullan, Shoshone Co., Idaho. Wesley Everett, pres. and gen. mgr.; H. E. Chaney, vice-pres.; Herman J. Rossi, treas.; preceding officers, W. W. Woods and Hugh Toole, directors; F. W. Calloway, mg. engr. Organized under laws of Montana, capitalization \$750,000, shares 50 cts. par.

Lands, 7 claims, well timbered, at Borax, Mont., near Lookout, just across the Montana line, adjoining the Leslie Copper Mining Co. Property shows a 15' vein in quartzite, exposed by surface trenching for 2,000', carrying galena, chalcopryrite and lead carbonates, associated with pyrite, with values mainly in galena. Development is by a 35' shaft and 2 tunnels, upper giving a back of about 200', lower planned to be 1,100' long, with back of 700', and to be the main working tunnel, with mouth near the Northern Pacific railway. Mine has about 2,000' of openings. Equipment includes a water-power plant developing 110 h. p., a 10-drill air compressor, 20,000' saw-mill, machine shop, smithy, carpenter shop and other necessary mine buildings. Property is served by the Northern Pacific railway, 160' from the mine.

AMAZON GOLD CO.

MEXICO

Mine office: Chacala, Durango, Mex. Jas. T. Dugan, pres.; Edward B. Sowers, mgr.; J. S. Wilkinson, supt., at last accounts. Mine, known as the Candelaria, has auriferous, argentiferous and bismuthiferous copper ores. Equipment includes a Bryan mill, 6-ton chlorination plant and 10-ton smelter. Closed down and no reports received owing to Mexican revolution.

AMAZONE MINE.

WASHINGTON

Mine office: Chewelah, Stevens Co., Wash. Oppenheimer Bros., owners. Property, adjoining the United Copper Mining Co., on the north, is developed by tunnel. Ore is malachite and chalcopryrite, with streaks of tetrahedrite, latter running high in silver values.

AMELIA COPPER MINE.

MEXICO

Mine office: Noria, Magdalena, Sonora, Mex. Holt Bros., owners. Mine, 13 miles west of Noria, is developed by shaft, 420' deep, Feb., 1912, with lateral openings on the 200, 300 and 400' levels. A crosscut on the 200' level exposes a 20' vein, said to average 6% copper and 8 oz. silver, the openings on the 300 and 400' levels disclosing a gossan only.

Equipment includes a 30-h. p. gasoline hoist. Property held under lease and bond by Mexican Metals Co. in 1910-11, and work mentioned above done on the property, but failure to find ore on lower levels led to forfeiture of bond, as owners refused an extension of time.

AMERICAN & CANADIAN MINING CO.

BRITISH COLUMBIA

Idle several years and presumably dead. Lands are in vicinity of the Tyee mine, on Vancouver Island, B. C. Organized 1907.

AMERICAN CELTIC COPPER CO.

ARIZONA

Office: Allen G. Shaw, sec., 504 I. W. Hellman Bldg., Los Angeles, Cal. Incorporated 1912, capitalization \$3,000,000, shares \$5 par; issued \$2,000,000. Is a successor of the Arizona-Morenci Copper Co. and owns all its property.

Property, 98 claims, 2,000 acres, in 9 groups in Clifton-Morenci district, Greenlee Co., Ariz. Mines are adjacent to and surrounded by the Phelps-Dodge, Arizona Copper and Shannon properties. Mill and town sites are on the San Francisco river and the Morenci Southern railway crosses the ground.

AMERICAN CONSOLIDATED COPPER CO.**UTAH**

Office: Judge Bldg., Salt Lake City, Utah. Mine office: Brighton, Salt Lake Co., Utah. John C. Barnard, pres. and mgr. Organized 1907, under laws of Utah, capitalization \$500,000, shares \$1 par; 455,000 shares issued.

Lands, 27 claims, in Big Cottonwood district, adjoin Tar Baby mine on the west. Property is developed by several tunnels, longest being 1,200'. Dec., 1911. Presumably idle.

AMERICAN CONSOLIDATED MINES CO.**NEW MEXICO**

Mine office: Twining, Taos Co., N. M. J. Shumaker, pres.; C. D. Weimer, sec.-treas. Organized Nov., 1901, under laws of New Mexico, capitalization \$3,000,000, shares \$1 par. Lands, 19 claims, area 380 acres, also a 5-acre mill site and a half interest in 380 acres of timber lands, in the Rio Hondo and Lake Fork districts. Has secured assays of 3% copper and \$16 gold per ton, from ores cut in 3 tunnels, longest 510'. Property apparently has large orebodies of low grade. Idle and apparently dead.

AMERICAN COPPER CO.**ARIZONA**

Mine office: Globe, Gila Co., Ariz. Samuel L. Gibson, pres.; J. F. Coughlin, vice-pres.; John L. Alexander, sec.; Wm. Ryan, treas. Organized 1905. Owns American mine 3 miles from the Gibson mine, with 2 shafts, deepest 165', showing chalcocite and argentiferous tetrahedrite, latter assaying up to 70 oz. silver per ton. Idle several years.

AMERICAN COPPER CO.**UTAH**

Idle several years and presumably waiting for development on its neighbor's ground. Lands, adjoining the Last Chance Mining Co., in Big Cottonwood canyon, are slightly developed.

AMERICAN COPPER CO.**WYOMING**

Idle. Thos. M. B. Hicks, pres. and treas., Williamsport, Pa. Mine near Holmes, Albany Co., Wyo. Otto C. Clinger, sec.; LeRoy Scholl, cons. engr. Organized Aug. 23, 1902, under laws of Wyoming, capitalization \$1,000,000, shares \$1 par. Company owns 50,000 shares, par \$10, of capital stock of Arizona National Copper Co.

Lands originally were 40 claims, unpatented, area 800 acres, including the Gold Crater group in the Douglas Creek division of the Encampment district, diminished through failure to do annual assessment work. The property, about 1 mile from the Rambler mine, has a 20' fissure vein, in granite, said to be composed of 3 distinct layers, first being porphyritic, with width of 6 to 7', carrying about 1.5% copper and \$7 gold per ton, with a little covellite assaying 60% copper and \$20 gold per ton; second layer, of 6 to 7', is of jaspelite and diorite, carrying decomposed iron ore giving assays of \$20 to \$150 gold, and the third layer, said to be brecciated, carries oxide, carbonate and sulphide copper ores, with quartz gangue. The Gold Crater group has a tunnel, having a little very rich gold ore. Mine also has shafts of 50, 60 and 160', and the 330' Albany shaft, with a total of about 1,800' of workings. Equipment includes an 80-h. p. boiler, hoist, Norwalk air compressor and electric light plant, with about 15 buildings. Idle several years.

AMERICAN COPPER & MINING CO.**NEW MEXICO**

Idle several years. Office: St. Joseph, Mo. Mine office: Orogrande, Otero Co., N. M. Jas. C. Sager, pres.; J. J. Metcalf, sec. Capitalization \$1,000,000, shares \$1 par. Lands, 5 claims, area 100 acres, known as the Badger group, on Granite Mountain, 4 miles from Orogrande smelter, showing a 20' orebody and 4 smaller veins, opened by 5 shafts, deepest 140'. Has secured assays up to 12% copper and \$7.20 gold per ton.

AMERICAN COPPER MINING & MILLING CO.**UTAH**

Office: Lehi City, Utah. J. N. Butt, pres.; Charles Anderson, vice-pres.;

A. O. Slade, treas.; preceding officers, Howard Murdock and Chas. Herron, directors; William Asher, sec. Organized Aug., 1912, capitalization \$100,000, shares 10 cts. par.

Property is located in Tooele county. No trace of operations secured.

AMERICAN EAGLE GOLD & COPPER CO. CALIFORNIA

Mine office: Needles, San Bernardino Co., Cal. W. A. Clark, owner. Lands, 17 claims, in the Whipple or Monument district, 10 miles west of the Colorado river, about 16 miles northwest of Parker. Property shows a main vein of 10 to 20' width, traceable 2,000', with a number of smaller parallel veins. Development includes shafts of 60' and 300', latter with crosscuts on the 100' and 200' levels, showing oxidized ores to depth of about 75', succeeded by a considerable body of auriferous copper sulphides. Mine is said to have on the dump several hundred tons of ore of 10 to 20% copper tenor, carrying \$1.50 and up in gold. The mine water has been leached, to a small extent, for copper. Equipment includes a 20-h. p. gasoline hoist. Employs 15 men.

AMERICAN EXPLORATION CO. UTAH

Mine office: Park City, Summit Co., Utah. Frederick V. Bodfish, mgr. Property is a lease on the American Flag mine, at Park City, and company also is said to hold, presumably under option, various old mines in Little Cottonwood canyon, and, April, 1911, began driving a tunnel, planned to be 3,600' long to drain these properties.

Property, the American Flag mine, with 300 acres, patented, adjoining the Ontario and Silver King Coalition mines, and including the Constellation group. Mine is drained by the Ontario tunnel. Is developed by shafts and tunnels, to depth of 1,100', with about 2½ miles of workings, showing values mainly in gold and silver.

Equipment includes steam power and a 60-h. p. air compressor. Production of old company, Aug., 1904, to Sept., 1910, was 8,550 dry tons of ore, yielding net smelter returns of \$272,235. Present company is energetically developing the ground on the 1,000' level; has opened up an 18" pay-streak on the east vein, carrying 2% lead, 3.1% copper and high gold and silver values. This is stoped for a length of 150'. Property valuable and management able.

AMERICAN EXPLORATION & MG. CO. MEXICO & NEW MEXICO

Office: 60 State St., Boston, Mass. Operating office: 518 Trust Bldg., El Paso, Tex. Mine offices: Steeple Rock, Grant Co., N. M.; Ahumuda, Bravos, Chihuahua, Mex., and Terrazas, Iturbide, Chihuahua, Mex. W. Franklin Burnham, pres., sec. and gen. mgr.; Henry A. Haile, treas.; preceding officers, Jas. Duckworth, Geo. Empsall, Hinsdale Smith, Arthur Smith, Jesse W. Morton and Harry Hinckley, directors; Wm. A. Farish, cons. engr.; John A. Rice, engr.; John Searls, supt. Ahumuda mines; Frank Hickman, supt. Steeple Rock mines. Organized Sept. 28, 1907, under laws of Maine, capitalization \$500,000, shares \$1 par, non-assessable; issued, \$275,748.

Lands, 600 acres, including 16 claims in New Mexico and 12 different properties in Mexico, also 3 mill sites at the different properties.

Property includes mines known as the Burnham at Terrazas, San Ignacio at Ahumuda, and Hinckley at Steeple Rock. The New Mexican property has tunnels of 100' and 313' and shafts of 100', 100' and 150', with 1,223' of workings, carrying mainly silver ore. The property at Ahumuda has shafts of 25', 100', 160' and 474', giving ore assaying about 30% lead, 6% zinc and 12 to 20 oz. silver per ton. The property at Terrazas shows contact deposits between limestone and porphyry, giving assays of about 3% copper, 24% lead, 8 to 20 oz. silver and \$2.50 to \$12 gold per ton. De-

velopment is by shafts of 187' and 200'. Equipment includes a 55-h. p. gasoline plant and necessary mine buildings.

Company plans milling about 30 tons daily at Ahumada, concentrating 6 into 1, and continuing development work at the various properties.

AMERICAN FINANCE & SECURITIES CO.

NEW YORK

Office: 5 Nassau St., New York. Owns majority of stock of the El Tiro Copper Co., which see.

AMERICAN FLAG MINING CO.

UTAH

Office: 815 Newhouse Bldg., Salt Lake City, Utah. Mine office: Park City, Summit Co., Utah. Geo. H. Rathman, pres., treas. and gen. mgr.; Wm. M. Curtis, vice-pres. and mgr.; John Cain, sec.; F. V. Bodfish, supt. Organized 1902, under laws of West Virginia, capitalization \$500,000, shares \$1 par, assessable; fully issued. A 3-ct. assessment was levied June 28, 1910. Stockholders voted unanimously to reincorporate under the laws of Nevada and increase capitalization to \$1,000,000, shares \$1 par, issuing new stock to retire a bond issue of \$150,000 and pay for the Constellation group. The American Flag mine was leased for 5 years to the American Exploration Co. and is described under that title.

AMERICAN METAL CO., LTD.

UNITED STATES & MEXICO

Office: 52 Broadway, New York. Mexican office: 3 Calle de San Agustin, Mexico, D. F. Also has branch offices in Denver and St. Louis. Company is American agent for Henry R. Merton & Co., Ltd., of London; Metallgesellschaft and Metallurgische Gesellschaft, of Frankfurt am-Main; Société le Nickel, of Paris, and Balbach Smelting & Refining Co., of Newark, N. J. Controls the Compania Minera de Penoles, of Mapimi, Mex.; Compania de Minerales y Metales of Mexico; Ohio & Colorado Smelting & Refining Co., of Salida, Colo.; Bartlesville Zinc Co., of Bartlesville, Okla.; Lanyon-Star Smelting Co., of Bartlesville, Okla., and Metallurgical Company of America, of New York. Company also is an extensive dealer in copper, spelter and lead.

AMERICAN-MEXICAN SMELTING & REFINING CO.

MEXICO

Is a subsidiary company of the Pacific Smelting Co. T. C. Kirkland, mgr., Fundicion, Sonora, Mex.

AMERICAN-MEXICO MINING & DEVELOPING CO.

MEXICO

Office: Watertown, S. D. Mine office: Velardena, Cuername, Durango, Mex. No returns received. Is not regarded favorably. See description by Horace J. Stevens in Vol. X.

AMERICAN MINE.

COLORADO

Wm. Mitchell, superintendent, Breckenridge, Summit Co., Colo. Property shows a fissure vein with ore shoot of gold and silver-bearing copper ore, developed by shaft. Equipment includes steam plant and air compressor.

AMERICAN MINES & EXPLORATION CO.

ARIZONA

The entire capital stock is said to be owned by Robt. D. Grant, 1003 Central Bldg., Los Angeles, Cal.

AMERICAN MINES SYNDICATE

UTAH

Office: Houghton, Mich. Mine office: Eureka, Juab Co., Utah. Walter Fitch, pres.; J. H. Rice, vice-pres.; Wm. P. Seager, sec.-treas.; preceding officers, M. M. Duncan and F. W. Denton, directors. Organized 1907, under laws of Arizona, capitalization \$100,000, shares \$100 par; paid in, \$80 per share; issued, \$86,350. Is a holding company purely controlling the Chief Consolidated Mining Co. through ownership of 361,000 shares.

AMERICAN MINING CO.

UTAH

Presumably idle. Office: 27 Latimer Blk., Salt Lake City, Utah. Mine office: Brighton, Salt Lake Co., Utah. I. A. Benton, pres.; A. L. Headberg,

first vice-pres. and gen. mgr.; B. F. Nevins, second vice-pres.; Wm. Crome, sec.-treas.; David Scott, supt. Organized 1896, under laws of Utah, capitalization \$500,000, shares \$1 par, assessable; 18 assessments levied, to end of 1910. Lands, 16 claims, 10 patented, on Scott hill, in the Big Cottonwood district, 5 miles from a railroad. Mine, opened by shafts and tunnels, has about 1,400' of workings, showing auriferous and argentiferous copper ore.

AMERICAN MINING CO., LTD.

IDAHO & MONTANA

Office: 115 Granite Blk., Helena, Mont. Mines are located in the Seven Devils district, Washington Co., Idaho. A. H. Kleinschmidt, pres.; Maria Kuphal, vice-pres.; R. H. Kleinschmidt, sec.-treas.; preceding officers are the directors. Organized Oct. 2, 1910, under laws of Montana, capitalization \$50,000, shares \$1 par, non-assessable; issued 11,578 shares, sold at \$1. Annual meeting, second Monday in January.

Property consists of a number of patented and unpatented claims in Montana and also a one-half interest in the Blue Jacket and Queen mines, near Landore, Washington Co., Idaho. The Blue Jacket mine, area 295 acres, has a 400' shaft, and the Queen has a 1,500' tunnel having a back of about 300'; these properties said to have produced about \$250,000 in ore, with smelter returns up to 47% copper. The company's half interest in this group was leased Oct., 1909, for 10 years to P. H. Miller and Franz Kleinschmidt, Landore, Idaho, on a royalty basis, giving the company 15% of the gross product of the mines.

Holdings also include a nine-sixteenths interest in the Peacock, White Mountain and Helena mines, held jointly with A. M. Holter and S. T. Houser; and a one-half interest in the Blue Jacket No. 2, Norma, Legal Tender, Copper Crescent and Calumet mines, held jointly with Messrs. Johnson and Kleinschmidt. The old American Mining Co., Ltd., whose charter expired Oct. 1, 1910, owned 9/16 of the Peacock, White Mountain and Helena claims and one-half of the Blue Jacket claim in Idaho and various other claims in Montana. On the dissolution of the company Albert, R. H. and Ellen Kleinschmidt, holding 50% of the company's stock, became joint owners of one-half of the company's holdings; the above individuals are in no way connected with the new American Mining Co., organized by R. H. Kleinschmidt. The new company is understood to have acquired a one-half interest in Mr. C. A. Johnson's one-half interest in the Queen and Blue Jacket groups, which with the one-quarter interest derived from the old company makes a one-half interest. These properties are also in the Seven Devils district, 20 miles west of Homestead, Ore., the nearest railway point.

The Peacock mine, discovered 1869, is the most noted property and the largest producer in the Seven Devils district, having 1,500' of workings, said to have produced 15,000 tons of high-grade ore, and estimated to show 200,000 tons of 6% copper ore with about \$5 combined gold and silver values per ton. Ten shipments, 1903, to the Bingham smelter, returned 13.3 to 18.3% copper, from 3 to 5 oz. silver and from nothing to \$1.33 gold per ton; and 11 shipments to the Oregon Smelting & Refining Co. gave returns of 20.5 to 40.2% copper, 1.15 to 8.7 oz. silver and \$1.20 to \$3.40 gold per ton. Mine is said to have considerable ore ready for shipment, as soon as railroad transportation is available, and the Oregon-Washington railroad line, when extended down the Snake river from Homestead, will pass within 3½ miles of the mine. Production, 1905, was 500 tons of ore, of about 15% copper tenor, equal to 150,000 lbs. fine copper. Property idle since 1909, owing to litigation.

AMERICAN MINING CO., S. A.

MEXICO

Idle. Letters unclaimed at Leon, Guanajuato, Mex. Organized Oct. 27,

1900, under laws of Mexico, capitalization 25,000 pesos. Property is the America y Anexas mines, carrying copper and lead ores.

AMERICAN SM. SECURITIES CO. UNITED STATES & MEXICO

Office: 165 Broadway, New York. Mine and works offices, at numerous points, given hereinafter. Organized March 25, 1905, under laws of New Jersey, and name changed to present title, May, 1905; capitalization \$77,000,000, shares \$100 par, in \$17,000,000 Series A cumulative 6% preferred stock; \$30,000,000 Series B cumulative 5% preferred stock, and \$30,000,000 common stock Series A has preference as to dividends, and both preference series have equal rights as to assets, both having priority rights to assets and dividends over common stock. Is controlled by American Smelting & Refining Co., through the ownership of the entire issue of common stock, and the American Smelting & Refining Co. guarantees the Series B. preferred stock. An issue of \$15,000,000 of 15-year 6% debenture bonds, created Feb., 1911, to liquidate a floating debt of \$10,816,406, and going entirely to the American Smelting & Refining Co., are convertible into common stock of that company any time before Aug., 1918, that bonds may sell at or above par. Bonds are redeemable Feb. 1, 1926, at par, or, after Feb. 1, 1915, at 105, on 90 days' notice.

Owms in fee mines in 7 different districts in Mexico, the smelter at Everett, Wash., and controls the principal copper and lead smelting and refining plants of the United States. It also owns all or a controlling part of the stock of a large number of subsidiary companies. All properties are described under the title American Smelting & Refining Co.

AMERICAN SMELTING & REFINING CO. U. S. & MEXICO

Office: 165 Broadway, New York. Daniel Guggenheim, pres.; Barton Sewell, vice-pres.; Silas W. Eccles, vice-pres. in charge of operating department; Edw. Brush, vice-pres. and asst. to pres.; Edgar L. Newhouse, vice-pres. in charge of smelting operations; Isaac Guggenheim, treas.; S. R. Guggenheim, chairman exec. com.; Murry Guggenheim, chairman fin. com.; Judd Stewart, gen. aud. and asst. to pres.; F. R. Raiff, traffic mgr.; John N. Steele, gen. counsel; Frank W. Hills, comptroller; Franklin Guiterman, gen. mgr. Colorado Dept.; H. R. Wagner, gen. mgr. Mexican dept.; John K. MacGowan, purch. agt.; preceding officers, Jos. Clendenin, mgr. copper sales dept.; W. S. McCormick, Willard S. Morse, Walter T. Page, Grant B. Schley, Karl Eilers, C. W. Whitley, Wm. Loeb, Jr., L. Friedrich, H. A. Prosser, Wm. C. Potter, Simon Guggenheim and Mahlon D. Thatcher, directors; W. E. Merriss, sec.; F. R. Foraker, asst. sec. and asst. gen. counsel; Lucius A. Chapin, asst. treas.; R. P. Reese, aud.; E. A. Behr, sales agt., lead sales dept.; W. M. Drury, mgr., mining dept.; Thos. H. Leggett, cons. engr.; C. W. Whitley, gen. mgr. Utah dept; H. M. Moran, gen. rep. in Mexico; F. D. Aller, agt. in Chile; Chas. Beach, transfer agt.; Chase National Bank, New York, registrar.

Organized April 4, 1899, under laws of New Jersey, capitalization \$115,000,000, with \$65,000,000 common and \$50,000,000 cumulative 7% preferred stock; shares \$100 par. Original capitalization was \$54,600,000, increased to \$100,000,000 and again increased Jan., 1911, by \$15,000,000 common stock authorized to exchange for 6% debenture bonds of American Smelters Securities Co. at any time before Aug., 1918, that bonds may sell at par. Annual meeting, first Wednesday in April. Has about 11,000 shareholders.

The American Smelting & Refining Co. controls the American Smelters Securities Co. through the ownership of the entire common stock issue of \$30,000,000, and has guaranteed 5% dividends on the entire stock issue of Series B preferred stock of the American Smelters Securities Co.

Company's statement of Dec. 31, 1912, shows assets of \$189,211,705, in-

cluding \$3,809,373 cash and \$5,935,873 demand loans made to affiliated companies. Surplus, same date, was \$16,759,402.

Net earnings for fiscal years ending April 30, were \$1,979,907.85 in 1900; \$3,828,441.27 in 1901; \$4,861,619.01 in 1902; \$7,576,785.57 in 1903; \$7,905,572.84 in 1904; \$8,898,811.36 in 1905; \$10,161,358.12 in 1906; \$11,509,669.20 in 1907; \$7,633,286.64 in 1908; \$7,664,284.20 in 1909; \$7,507,916.39 in 1910; and for calendar years ending Dec. 31, were \$10,571,502.64 in 1911, and \$11,079,675.78 in 1912.

Dividends on common stock have been as follows, 5% in 1904; 5½% in 1905; 7% in 1906; 7½% in 1907; 5% in 1908; 4% in 1909; 4% in 1910; 4% in 1911; 4% in 1912. Preferred dividend rate is 7% annually, in quarterly dividends of 1¾%. Total dividends to end of calendar year 1912, were \$66,713,053.

Following is the list of metallurgical plants of the company:

Perth Amboy plant, Maurer, N. J., copper and lead smelting and refining.

National plant, South Chicago, Ill., lead refinery.

Omaha plant, Omaha, Neb., lead refinery, copper smelting and converting.

Globe plant, Denver, Colo., lead smelting.

Pueblo plant, Pueblo, Colo., lead smelting.

Eilers plant, Pueblo, Colo., lead smelting.

Durango plant, Durango, Colo., lead smelting.

Arkansas Valley plant, Leadville, Colo., lead smelting.

Murray plant, Murray, Utah, lead smelting.

Everett plant, Everett, Wash., lead smelting and arsenic refinery.

Helena plant, East Helena, Mont., lead smelting.

Kansas City plant, Kansas City, Mo., lead and copper smelting.

Grant plant, Denver, Colo., lead smelting.

Hayden plant, Hayden, Ariz., copper smelting.

Pennsylvania plant, Pittsburgh, Pa., lead refinery.

Aurora plant, Aurora, Ill., lead refinery.

Garfield smelter, Garfield, Utah, copper smelting.

Selby smelter, Selby, Cal., described under this title.

Tacoma smelter, Tacoma, Wash., described under this title.

El Paso plant, El Paso, Tex., lead and copper smelting.

Aguascalientes plant, Aguascalientes, Mex., lead and copper smelting.

Monterey plant, Monterey, Mex., lead smelting.

Chihuahua plant, Chihuahua, Mex., lead smelting.

Velardena smelter, Velardena, Mex., described under its own title.

Baltimore plant, Baltimore, Md., copper refining plant.

The Helena, or East Helena smelter, at Helena, Mont., of about 600 tons daily capacity, with 4 blast furnaces, treats mainly silver-lead ores, with some copper, and includes a baghouse. Frank M. Smith, mgr.; G. C. Riddell, supt.

The Murray smelter, at Murray, Utah, 16 miles south of Salt Lake City, of 1,500 tons daily capacity, has 8 blast furnaces, with steam, electric and air power. A 100x216' bag house has 4,200 cotton bags, each 30' long and 18" in diameter, the cloth therein being sufficient to cover 16 acres of ground. The bag house, in addition to saving considerable values previously lost, has greatly reduced the volume of fumes, which formerly caused much trouble and expense, through damage to a valuable farming district surrounding.

The Arkansas Valley smelter, at Leadville, Colo., has 10 furnaces, with daily capacity of 1,500 tons, and handles mainly lead ores, with some

copper. Wm. B. MacDonald, mgr.; Guy M. Kerr, supt. The other plants at Leadville have been dismantled for some years.

The Globe or Globeville smelter, at Denver, Colo., with 7 furnaces, has about 800 tons daily capacity. F. Roeser, supt.

The old Grant smelter, at Denver, Colo., was dismantled 1907.

The Durango smelter, at Durango, Colo., has 4 furnaces, with about 400 tons daily capacity, and treats both lead and copper ores. F. C. Gilbert, supt.

The Omaha smelter, at Omaha, Neb., is operated under a lease expiring 1927. The smelter, with 2 furnaces, of about 250 tons daily capacity, has a copper converting plant of about 35 tons daily capacity, and a 250-ton lead refinery, with steam and electric power. Wm. T. Page, mgr.

The Eilers smelter, at Pueblo, Colo., with 6 furnaces, of about 700 tons daily capacity, closed 1908, and probably will not be reopened.

The Pueblo smelter is a lead plant, securing gold and silver as by-products, having 7 furnaces, with about 800 tons daily capacity. Geo. P. Marsh, supt.

The El Paso smelter, at El Paso, Tex., has a 1,500-acre site, with 10 furnaces, and a daily capacity of about 1,200 tons, with 2 reverberatory furnaces being built at end of 1910, to increase the daily capacity to about 1,500 tons. Matte formerly was shipped to the Aguascalientes smelter, but is to be converted in the El Paso works, and blister copper shipped to the refineries at Perth Amboy and Baltimore.

The Aguascalientes smelter, at Aguascalientes, Mex., has 10 furnaces, 2 lead and 8 copper stacks, with 2,000 tons daily capacity, and employs about 2,500 men. This plant includes a model townsite, with good water and sewerage. A. C. Hall, supt.

The Chihuahua smelter, at Chihuahua, Mex., is a comparatively new plant, rated at 800 tons daily capacity, having 4 blast furnaces, treating mainly lead, with steel buildings, a 370' brick stack with inside diameter of 16', steam and electric power, 8 miles of railroad track, a hotel, and 192 dwellings for workmen. J. R. Enlow, supt.

The Velardena smelter has an annual capacity of 324,000 tons of copper ore and 187,000 tons of lead ore.

The Monterey smelter, at Monterey, Nuevo León, Mex., has 10 blast furnaces and 15 reverberatories, with daily capacity of about 1,250 tons. J. F. Austin, supt.

The Everett plant, at Everett, Wash., has a lead smelter and an arsenic refinery.

The Perth Amboy plant, also known as the Guggenheim works, at Perth Amboy, Middlesex Co., N. J., has a copper-refining plant, built 1895, and since repeatedly enlarged. These works, having the advantages of tidewater frontage and rail connections, have copper and lead furnaces, with large lead and copper refineries, of 150 tons daily capacity each.

The National plant, at South Chicago, Ill., is an extensive lead refinery, having a yearly capacity of about 90,000 tons of finished lead and 18,000,000 oz. refined silver.

The Baltimore copper refinery, treating 240,000,000 lbs. of fine copper annually, is the largest refinery in the world. It is operated as the Baltimore Copper Smelting & Rolling Co., whose entire stock was bought for \$4,000,000. Includes copper smelting plant and rolling plant as well as refinery, all at Baltimore, Md.

The company also owns the San Bruno smelter site of 65 acres on San Francisco bay, 8 miles south of San Francisco.

The Garfield smelter of the Garfield Smelting Co. is owned through the

American Sm. Sec. Co., which owns the entire stock issue of \$1,000,000 and includes control of the Garfield Improvement Co. and Garfield Water Co., subsidiaries of the Garfield Smelting Co. The Garfield Co., incorporated in New Jersey as the Silver Lake Mines Co., also owns 1,506 acres of mining and milling property in the Animas district, Colorado, yielding complex copper-lead ores carrying gold and silver. The Garfield plant treats 1,170,000 tons annually; it is described under Garfield Smelter.

In addition to the foregoing smelting plants, the company has other extensive interests, and controls the United States Zinc Co. of Pueblo, Colo.; Carbon Coal & Coke Co., of Trinidad, Colo.; Cook's Peak Mines, of Cooks, N. M..

The company (by the American Smelters Securities Co.) owns outright the following mining properties: Dolores, Azul and Trinidad mines; also owns the La Luz and El Angel mines at Matehuala, Mex.; the Jibosa mine at Jimenez, Veta Grande at Parral and Tecolotes mine at Santa Barbara, all in Chihuahua, Mex.; the Zaragoza mine, Monterey and Bonanza at Zacatecas, Mex. Company also controls several other properties in Mexico.

The Anganguero mine, W. H. Mitchell, supt. at last accounts, is at Anganguero, Michoacan, Mex. Lands, 12 hectares, carrying argentiferous copper ore; developed by a 150-meter shaft, and 2 tunnels, with about 1 mile of workings. This property formerly was a considerable silver producer, and includes an antiquated smelter, of about 150 tons daily capacity.

The Asientos group, at Asientos, Ocampo, Aguascalientes, Mex., Corey C. Brayton, supt., includes the Santa Francisca, Cinco Senores and El Dragon mines, having silver-lead ores and employing about 700 men. The Santa Francisca, area 317 hectares, with 3 tunnels and 4 shafts, deepest 250 meters, has about 6,000 meters of workings, with a daily productive capacity of 500 metric tons of ore. Equipment includes a 1,500-h. p. steam plant, and mine employs about 700 men.

At Matehuala, S. L. P., Mex., company owns the Dolores, Trinidad and Azul mines, area 151.9 acres. Edw. Thornton, mine supt. These properties, 7 miles west of Matehuala, have 7 shafts, with gasoline hoists, and carry silicious copper sulphide ores, slightly argentiferous and auriferous, averaging about 4.5% copper.

The Jibosa mines, at Jimenez, Chihuahua, Mex., area 87 acres, have 3 shafts and carry basic copper sulphide ores, assaying up to 10% copper.

The Veta Grande mine, area 58 acres, at Parral, Chihuahua, Mex., has a 984' shaft, well equipped, and produces silicious silver ores.

The Tecolotes mines, at Santa Barbara, Chihuahua, Mex., include 160 acres of mining rights, and 40 acres of surface rights. W. Maynard Drury, mgr. Mines are extensively developed, and carry auriferous and argentiferous oxidized and sulphide ores of lead and copper, of both smelting and concentrating grades. Equipment includes a 600-ton mill, putting about 6 into 1, yielding an average of about 100 tons of concentrates daily. Property employs about 500 men.

The Bonanza mines, area 335 acres, with 13,000 acres of ranch lands, at Zacatecas, Mex., have 7 shafts, and carry lead and zinc ores.

The Zaragoza mine, at Parral, Chihuahua, Mex., area 69 acres, is developed through a 1,000' tunnel, and has plumbiferous iron ore, zinc carbonates and sulphides, and copper sulphides.

The Sierra Mojada mines, at Sierra Mojada, Coahuila, Mex., include the San José, San Salvador and Fronteriza mines, producing lead and copper ores, with values mainly in silver and lead. Mines have 8 shafts and 5 tunnels, with productive capacity of about 1,000 tons of ore daily, employing about 800 men. Equipment includes a 500-h. p. steam plant.

In addition to smelting and mining properties, the company owns the exclusive rights, in the United States and Mexico, to the Huntington-Heberlein ore-roasting patents. There also are various subsidiary corporations, for ore purchasing and other purposes, copper ores being handled mainly through the American Smelters Securities Co. as follows:

Balaklala Consolidated Copper Co., Coram, Cal.
 Dairy Farm Mining Co., Van Trent, Cal.
 Selby Smelting & Lead Co., Selby, Cal.
 A. Y. & Minnie Mining & Milling Co., Leadville, Colo.
 Silver Lake Mines, Silverton, Colo. (Garfield smelter).
 Western Mining Co., Leadville, Colo.
 Federal Mining & Smelting Co., Wallace, Idaho.
 Federal Lead Co., Federal, Ill.
 Central Lead Co., Flat River, Mo.
 Federal Lead Co., Flat River, Mo.
 Puget Sound Reduction Works, Everett, Wash.
 Tacoma Smelting Co., Tacoma, Wash.
 Monte Cristo Mining & Concentrating Co., Monte Cristo, Wash.
 Botello Mines, Parral, Chihuahua, Mex.
 Velardena Mining & Smelting Co., Velardena, Durango, Mex.
 National Metallurgical Co., Matehuala, San Luis Potosi, Mex.
 Baltimore Copper Smelting & Rolling Co., Baltimore, Md.

Copper production is merely an incident with the company. The following figures of production include the outputs of the American Smelter Securities Co., Guggenheim Exploration Co., Nevada Consolidated Copper Co. and Utah Copper Co.: 72,952,000 lbs. fine copper in 1905; 85,810,000 lbs. in 1906; 94,600,000 lbs. in 1907; 187,544,000 lbs. in 1908, 240,000,000 lbs. in 1909, and about 250,000,000 lbs. in 1910. Annual product of refineries in 1912 was 132,000,000 lbs. fine copper and the total value of the metal products handled is about: Copper, \$46,000,000; silver, \$47,000,000; lead, \$27,700,000; gold, \$69,800,000, or a total of \$190,500,000.

The American Smelting & Refining Co. is much the largest general smelting and metallurgical enterprise in the world. There has been much complaint, throughout the mining districts of the United States and Mexico, regarding the exactions of this company, but there is much to be said on both sides. It seems obvious that the American Smelting & Refining Co. continues to expand and prosper, mainly because of its superior metallurgical and business ability, backed by large and modern works and adequate capital, rather than because of special advantages.

AMERICAN STAR MINING CO.

UTAH

Office: 403 Dooly Bldg., Salt Lake City, Utah. Mine office: Eureka, Juab Co., Utah. Imer Pett, pres. and gen. mgr.; Jas. B. Graves, vice-pres.; Fred R. Sands, sec.-treas.; preceding officers Geo. E. Davis and Thos. P. Billings, directors. Organized 1909 under laws of Utah, as successor of Tintic Mines Co., capitalization \$1,000,000, shares \$1 par; issued 599,500 shares. Lands, 2 claims, 25 acres, including the Town View group and other properties lying between the Victoria and Chief Consolidated mines, and touching the Plutus on the east and Eagle & Blue Bell on the west. Mine has about 1,000' of workings, made from the 900' level of the Eagle & Blue Bell mine, and plans a 1,100' shaft, about one-half mile southeast of the Chief Consolidated. Workings show an ore channel of about 60' width. Property considered promising.

ANACONDA COPPER MINING CO.

MONTANA

Office: 42 Broadway, New York. Mine office: Butte, Silver Bow Co., Mont. Works offices: Anaconda, Deer Lodge Co., Mont., and Great Falls,

Cascade Co., Mont. Benj. B. Thayer, pres.; C. F. Kelley, vice-pres.; A. H. Melin, sec.-treas.; preceding officers, John D. Ryan, H. H. Rogers, Wm. Rockefeller and Geo. H. Church, directors; Cornelius F. Kelly, counsel; J. T. Roberts, asst. sec.; D. B. Hennessy, asst. treas.; John Gillie, gen. supt.; E. P. Mathewson, mgr. Anaconda Reduction Works; C. W. Goodale, mgr. Boston & Montana dept.; A. E. Wheeler, supt. Great Falls smelter.

Organized June 18, 1895, under laws of Montana, as successor of Anaconda Mining Co., capitalization \$150,000,000, shares \$25 par, issued \$108,312,500. Original capitalization \$50,000,000, increased to present figure March, 1910. Company has a very broad charter permitting it to acquire, mortgage, lease, assign and transfer the capital stock, bonds or securities of any other corporation. Is controlled through ownership directly and indirectly of 3,158,362 shares, or 73% of the issued stock, by the Amalgamated Copper Co. Annual meeting in May. National City Bank, New York, transfer agent. Pogson, Peloubet & Co., auditors. Stock is listed on the New York, Boston and London stock exchanges, and on the New York Consolidated Stock Exchange. Dividend coupons are payable in England by the London Joint Stock Bank, Ltd., Princes St., E. C. Warrants to bearer are issued, in England, in denominations of 5, 20 and 50 shares.

Dividends have been as follows: \$4,800,000 in 1900; \$3,900,000 in 1901; \$1,250,000 in 1902; \$1,200,000 in 1903; \$1,200,000 in 1904; \$3,450,000 in 1905; \$6,900,000 in 1906; \$6,300,000 in 1907; \$2,400,000 in 1908; \$2,400,000 in 1909; \$6,930,000 in 1910; \$8,608,750 in 1911; \$10,831,250 in 1912.

Regular dividend rate at present is 3%, or 75 cts. per share quarterly.

Net earnings for 1912 were \$15,856,334.89, including \$308,346.22 earned by various subsidiary corporations and departments, outside of regular mining operations. Net earnings for 1911 were \$8,043,718.76. Company ended 1912 with a surplus of \$8,695,172.45.

The increase in capitalization from \$50,000,000 to \$150,000,000, 1910, was made for the absorption of all of the Butte mining companies controlled by the Amalgamated Copper Co., and several other mines in Butte, also the coal mining and lumbering companies controlled by the Amalgamated. The companies so taken over, and the prices paid for each were as follows: Boston & Montana Consolidated Copper & Silver Mining Co., 1,200,000 shares, or \$30,000,000; Washoe Copper Co., 380,000 shares, or \$9,500,000; Trenton Mining & Development Co., 120,000 shares, or \$3,000,000; Red Metal Mining Co. (Butte Coalition), 500,000 shares, or \$12,500,000; Butte & Boston Consolidated Mining Co., 300,000 shares, or \$7,500,000; Parrot Silver & Copper Co., 90,000 shares, or \$2,250,000; Alice Gold & Silver Mining Co., 30,000 shares, or \$750,000; Big Blackfoot Lumber Co., 300,000 shares, or \$7,500,000; Diamond Coal & Coke Co., 100,000 shares, or \$2,500,000. In addition to the affiliated companies before named that were taken over, the Anaconda bought the entire property of the Colusa Parrot Mining & Smelting Co. and Original Consolidated Mining Co., controlled by Senator Wm. A. Clark, for which \$5,000,000 cash was paid.

In addition to the mining property hereinafter described, the Anaconda owns fractional interests in a number of other mining claims in the Butte camp. Mining lands in Butte are approximately 2,138 acres, in the following groups: Anaconda, 572 acres; Boston & Montana, 483 acres; Butte & Boston, 261 acres; Trenton, 220 acres; Butte Coalition, 145 acres; Alice, 340 acres; Parrot, 40 acres; Washoe, 37 acres; Original, about 40 acres. In addition to the copper mining lands, the Diamond Coal & Coke Co. owned 13,280 acres of coal land, and the Big Blackfoot Milling Co. owned upwards of 1,100,000 acres of timber land.

By the merger of the Anaconda and Boston & Montana, both among

the six largest copper producers of the world, and the addition of a number of other mines of second and third rank in productive capacity, the Anaconda became the largest copper company in the world, employing about 12,000 men, at high wages, and with a payroll in Butte alone of over \$1,000,000 monthly, with very large additional payrolls at its works in Anaconda and Great Falls. Since the absorption of the other mines of Butte has practically eliminated property lines so far as underground work is concerned and workings have been so connected as to permit the most economic mining regardless of claim boundaries, the property can be most usefully described in sections called by the familiar names used under former ownership, or by the names of the 22 operating shafts of the company.

The mines of the company produced in 1912, 4,576,289 tons of ore and 3,667 tons of copper precipitate. The Anaconda mine was opened, 1880, as a silver producer, but at about 150' depth the oxidized silver ores were succeeded by high-grade copper ores, mainly chalcocite and bornite, while at depth there is a large amount of enargite. Net earnings of the mine, during the 15 years, 1880-1894, are unknown, but may be safely estimated as not less than \$50,000,000. At a depth of about 1,600' quartz pyrite veins of the Anaconda showed impoverished values, there being considerable pyrite, but there was an improvement at 1,800 and 2,000' and very rich ore has been found below 2,200', while high-grade chalcocite is found at a depth of 3,400' in the High Ore mine, this being the deepest level now opened in the Butte camp. The various mines of the Anaconda have immense reserves of ore of all grades, estimated at 8 years' supply with no prospect of impoverishment in the bottom workings. The ore extracted from the various mines averages $3\frac{1}{2}\%$ copper, $2\frac{1}{2}$ to 3 ozs. silver and 35 cts. gold per ton.

The Anaconda mine proper has a 3-compartment shaft, 2,800' deep, timbered with 10x10" square sets, connected underground with the Never Sweat, St. Lawrence, Bell, Wild Bill, East Grey Rock, Buffalo and Mountain Consolidated mines. Considerable trouble has been had, at times, with gases from the adjoining St. Lawrence mine, and the fire has crept from the St. Lawrence into several of the upper levels of the Anaconda. The mine has electric locomotives for tramping, installed 1907, on several levels. Hoisting is by 8-ton skips, swung under double-deck cages and worked in counterbalance.

The St. Lawrence mine has a 2,600' three-compartment main shaft, connected underground with the Anaconda, Never Sweat, Mountain View and Pennsylvania mines. The St. Lawrence has been on fire since 1889, in an extensive area above the 1,100' level. The fire has been fought constantly, and walled off by cement bulkheads wherever possible, but cannot be extinguished, and must be allowed to burn itself out, though it is possible to control its progress to a considerable extent. While the fire is troublesome, it does not result in the loss of copper, as the sintered ore remaining after the burning of the sulphur can be mined later, and the mine waters are strongly charged with copper, much of which is recovered by underground precipitation in concrete sumps, the water being leached again on surface. The hoist has 32x72" cylinders, raising 9-ton skips swung under double-deck cages.

The Never Sweat mine has a 2,500' three-compartment main shaft, re-timbered, 1905, with false sets, allowing an 18" play for squeeze. Square-set timbering is used, with back filling. The mine is connected underground with the Parrot, Colusa-Parrot, and Moonlight mines. Some trouble has been had with fire from the St. Lawrence. Normal productive capacity is

about 400 tons daily. The surface plant includes a 3,000-h. p. hoist with 30x72" cylinders, raising 8-ton skips swung under double-deck cages.

The Belmont mine, about 1 mile south of the main shaft of the Anaconda, and 375' lower, has a new 2,400' four-compartment working shaft, the largest in the district. Connections have been made with other mines and a 5,000-ton ore bin erected. It is said that this will be the main working shaft for the area now served by the Anaconda, Never Sweat, St. Lawrence and Pennsylvania shafts. Equipment includes a powerful new hoist, with capacity of 3,500', taken from the Corra mine.

The Diamond mine has a 2,956' three-compartment shaft, developing the Corra vein and other veins from the surface down to the 2,800' level. Equipment includes a 32x72" Risdon hoist, operating double-deck cages with 8-ton skips.

The Bell mine has a 1,600' three-compartment shaft, and is connected underground with the Anaconda, now used as an air shaft.

The High Ore mine is one of the deepest in Butte, having a 3,400' three-compartment shaft with lowest level at 3,200', producing high-grade chalcocite. Being the deepest mine of the camp, the High Ore does the pumping for a number of connecting mines of the Anaconda, handling 11 water from the Anaconda, Washoe and Parrot properties. The mine has yielded much ore below the 1,400' level. The High Ore has 7 powerful pumps, including 3 Dixon pumps on the 2,200' level, 2 pumps on the 1,600' level and 3 on the 1,000' level. The mine has electric lights and bells. Hoisting is done with two 3-deck cages.

The Modoc mine has a 2,400' three-compartment shaft, connected with the High Ore mine. The Modoc works several veins besides the one of this name, its chief ore supply coming from the North Butte veins, which are stoped up to the North Butte Co.'s boundaries on the north and to the Ballaklava mine on the south.

The Mountain Chief mine, area 1.15 acres, lies next north of the Butte-Ballaklava, and is said to have produced about \$1,500,000 worth of ore from a shallow shaft. The Mountain Chief is developed to 500' by its own shaft but its deeper levels are worked through the High Ore mine. It is claimed by the Anaconda that the Butte-Ballaklava has mined ore from the Mountain Chief vein, at depth, which contention is denied by the Butte-Ballaklava, with consequent litigation.

In addition to the foregoing mines, the Anaconda group includes the Wake-up-Jim, Buffalo, J. I. C., Monitor, Henry George, Dutton, Colusa-Parrot, Nipper, Parnell and a number of smaller properties, idle or operated through other shafts.

The Parrot group of properties includes the former holdings of the Parrot Silver & Copper Co., 19 fractional claims, area 40.6 acres, embracing the Parrot, Little Mina, Bellona, Original No. 6 and the Oro Butte, Champion and Copper Reef mines, and various other small properties. Main shaft of the Parrot mine is now used as an air shaft and the ground is worked from the Original and Never Sweat shafts.

The Little Mina mine has a 1,200' two-compartment shaft, with levels opened at 600, 800, 1,000 and 1,200', connected with the West Steward mine. The mine is opened on a continuation of the Blue vein, showing on the 1,000' level an orebody of 4 to 18' width, carrying 3 to 4% copper and about 6 oz. silver per ton.

The Original No. 6 mine has a shaft of 1,000' depth, now used as an air shaft.

The Original, Steward and Gagnon shafts are on a western continuation of the Anaconda and Steward veins and in 1912 a continuous ore shoot of

good grade, over 2,700' long, was opened in the bottom level of these mines.

The Original mine has a 2,500' two-compartment shaft. The mine was located, 1864, in the first stampede to the new Silver Bow diggings and was the first mine patented in Butte.

The Steward mine has a 2,300' vertical shaft, showing, in the bottom workings, a 30' vein carrying ore of good copper tenor, with fair silver values. Equipment includes a 120' steel headgear and a 36x72" first-motion duplex hoist, good for 2,600'.

The Gagnon mine has 2 shafts, the old 2,300' three-compartment incline shaft, sunk at an angle of 74°, is only 150' from the Original shaft and a new vertical 2,400' shaft near the west end of the property. Equipment includes a 22x48" Dickson hoist, raising 3-ton skips with capacity of about 800 tons daily.

The Gagnon is the westernmost of the productive copper mines of Butte. Its ores have carried more silver than those of the mines farther east and have held a number of minerals like hübnerite, unusual elsewhere in the camp. The mine has been reported as all but worked out at several periods in its history, but its deepest levels now look better than the upper ones ever did and a great body of high-grade ore is reported on the 2,200' level near the west end line.

The Moonlight mine, once the principal producer of the Washoe Co., has ore averaging about 1 oz. silver for each unit of copper. The Moonlight has a 1,500' three-compartment shaft, connected underground, with the Blue Jay, Never Sweat, Anaconda and Pacific mines.

The Clear Grit mine has an 825' two-compartment shaft, but is worked through the Little Mina shaft, from the 1,000' level.

The Poulin mine, formerly owned by the Washoe Co., has a 1,200' shaft, but is operated through the 1,500' Buffalo shaft. The Poulin mine has produced a limited quantity of low-grade ore, averaging about 2% copper and 5 oz. silver per ton.

The Silver Bow No. 1 mine has a 1,000' shaft, connected with the Pennsylvania, Berkeley and No. 3 mines. It has been a good producer for many years.

Silver Bow No. 3 mine has a 700' shaft, developing several pyrite veins low in copper. It has been idle some years.

The Berkeley three-compartment shaft was 1,500' deep at the end of 1912. Production is about 350 tons daily. An 18x32" hoist raises 2 single-deck cages.

The Rarus mine has a 2,000' three-compartment shaft, and is connected on the 1,700' level with the Tramway mine. There are no 1,800 and 1,900' levels, as numbers change below the seventeenth, to correspond with actual depth. Mine shows a fine body of 6% ore on 2,000' level. The veins have divergent branches, and constitute a sort of a magnified stockwork, with an ore zone up to 300' in width, in places.

The Minnie Healy mine, area 5 acres, is now a part of the Tramway mine.

The Tramway mine, lying between the Minnie Healy and Rarus, formerly owned one-third by Butte Coalition and two-thirds by Butte & Boston, has a new shaft that is being made the central shaft for the Minnie Healy-Rarus group. The Tramway shaft, 2,400' deep, has 3 compartments, each 5'x4' 2" in the clear. The first of the new levels in the Minnie Healy is the thirteenth, about 50' below the old 1,500' level, in which fire was burning, 1908-1909. The Tramway has numerous bodies of ore, of 5 to 6% copper tenor, with good gold and silver values, the really great orebodies coming in between the 1,300 and 1,400' levels, and on the 1,700' level there

is an orebody up to 75' in width, averaging nearly or quite 7% copper. In 1912 the 2,200', now the bottom level, was opened up and a fine body of ore, larger and of as rich a grade as that on the level above, was disclosed.

Equipment at the Tramway mine includes a 92' steel headgear with 12' sheave wheels. A 32x72" Allis-Chalmers 2-cylinder Corliss hoist, with 12' drums, using 1½" round wire cables, has capacity to raise 7-ton skips from a depth of 3,500'. One compartment has 4-deck cages, and one has 2-deck cages, an auxiliary hoist being used for sinking and handling supplies and men, through the third compartment. The main surface plant of the department, at the Tramway shaft, includes a boiler house, engine house, carpenter shop, machine shop, office building, warehouse, and changing house with hot and cold water and shower baths for 150 men.

The Nipper mine of the Red Metal group includes the Nipper, Chief Joseph, Balm and L. E. R. claims. The Nipper mine, area 15.18 acres, has 2 shafts, of 1,000 and 1,200' depth, with 12 exits, being connected underground with the Parrot, Never Sweat and Little Mina mines, and has been operated to some extent through the Parrot shaft. Mine is timbered with 10x10" square sets.

The Green Mountain mine has a 2,500' three-compartment shaft, not deepened for several years.

The Mountain Consolidated mine has a 2,500' three-compartment shaft, with a good ore showing on the 1,400' level and below, and an especially good showing on the bottom level, at 2,500'. The mine has a 28x72" Union Iron Works hoist, operating 2 four-deck cages.

The East Grey Rock mine of the Butte & Boston group, yielding about 600 tons of ore daily, has a 1,600' 3-compartment shaft, equipped with a 20x48" hoist, operating 2 double-deck cages, and a 28-drill Nordberg air compressor. The mine has developed much high-grade ore in the past 2 years.

The West Grey Rock mine, producing about 125 tons daily, ore carrying values mainly in gold and silver, with a small percentage of copper, has a 1,660' shaft, the 1,600' being the deepest level opened in 1913. The veins, though small, carry good ore, rich in silver.

The Corra group includes the Corra and Rock Island mines, with a ninth interest in the Silver Queen; a third interest each in the Robert Emmet I and Robert Emmet II; a seventh interest in the Snoozer of the Raven Co., and a half interest in the Blackfoot mine. Area of this group is about 30 acres, including the Corra mine of 13.15 acres, Rock Island mine of 5.15 acres, and Snoozer claim of 9.37 acres.

The Corra mine has a 2,300' shaft, with a drainage crosscut on the 1,800' level, through the Diamond mine, to the main pumping plant of the High Ore mine. The mine shows mainly silver values above the 1,000' level, below which ore is low in copper, but higher in silver than the average of the district. Surface plant was dismantled in 1908.

The Leonard has an old 1,800' shaft, used for men and supplies and the main or No. 2, a new shaft of 4 compartments, 2,000' deep. Mine is timbered with 12x12" and 14x14" square sets, requiring monthly an average of about 1,000,000' of mine timber, board measure, as solid bulk-heading is necessary in most stopes, owing to the great width of the vein, which carries exceptionally good gold values. The 2,000' level opened in 1912 shows equally large and good orebodies. Water from the Mountain View, East Colusa and West Colusa mines drains to the 1,200' level of the Leonard and is forced thence to surface by 4 electric pumps. Valves are of pot form, and the entire water end is phosphor-bronze, columns being lined

with wood, thoroughly soaked in oil, and coated on the inside with lead, to withstand the corrosive action of the mine waters.

The surface equipment at the Leonard is the show plant of Butte, and is very complete, including a 152' steel headgear and 2,000-ton ore bins. The power plant has ten 250-h. p. boilers, and a 32x72" Nordberg hoist, good for 3,500' depth, raising cages with 10-ton skips swung under, with 1½" round cable. There also is a 12x14" Risdon sinking engine. Plant includes 3 air compressors, of 3,000, 4,000 and 5,000 cu. ft. capacity per minute, respectively.

The West Colusa mine has a 2,000' three-compartment shaft, with levels 100' intervals to depth of 1,200', and thereafter at 200' intervals. Shaft was retimbered, early 1910, and cut down to 3 compartments, being given false sets, to obviate squeezing, which caused much trouble in the past. Mine is timbered with 10x10" and 12x12" square sets, and shows vein matter up to 400' in width. Connection is had underground with the Mountain View and Leonard mines. Fire from the Minnie Healy caused trouble, 1909, but was gotten under control. Normal production is about 800 tons daily. Surface equipment includes a 60' Nordberg hoist, operating 2 single-deck cages, and a 13x12" Iron Bay sinking engine.

The East Colusa mine has a 900' three-compartment shaft with levels opened at 100' intervals from 300 to 700'. The mine has a vein of about 65' width, averaging 3 to 4% copper, with streaks ranging up to 12%. Production is about 200 tons daily.

The Pennsylvania mine has a blower on the 1,200' level, of 60,000 cu. ft. air capacity per minute. The Pennsylvania has an 1,875' three-compartment shaft, with levels at 100' intervals from 100 to 1,000', and at 200' intervals below. This property has extensive stopes above the 600' level, ore lying nearer surface than in most of the Butte mines. Equipment includes a 350-gal. electric pump on the 1,800' level, forcing water to a crosscut to the Leonard mine, whence it goes to the precipitating plant. Average daily production is about 1,100 tons. Surface equipment includes 2,000-ton ore bins, a 19x48" Allis hoist, operating 2 double-deck cages and a 12x24" sinking engine.

The Badger State mine, in the northwestern part of the camp, develops the Badger State, Auraria, Kentucky, Silver and Silver City claims. The mine has a 2,000' four-compartment shaft with extensive orebodies in 3 veins, which were opened up for stoping on the 1,100, 1,300, 1,400, 1,600 and 2,000' levels in 1912. The development on the 2,000' level shows the veins to be as large and rich as on the upper levels. The Emily shaft, auxiliary to the Badger, was deepened from 400 to 917', or 1,000' level of the Badger and connection made in 1912. This property is now an important producer, yielding 550 tons daily.

The Mountain View mine has a 2,249' three-compartment shaft, and a 1,800' air shaft. The Mountain View shows 6 veins of 8 to 60' width, ore averaging nearly 5% in copper tenor, being among the richest mines in the camp. Production about 1,400 tons daily. Equipment includes 4,500-ton ore bins, a hoist good for 3,000' depth, and a 12x14" Risdon sinking engine.

The Blue Jay mine has a 1,075' incline shaft, sunk at 72°, having 2 compartments to the 600' level and 3 compartments below. Hoist is 16x32", operating 2 single-deck cages, with skips swung under.

The Belle of Butte mine, in Walkerville, has a 500' shaft, developing argentiferous copper ore, with values mainly in silver, and has been worked, on a small scale, by lessees, since 1895.

The Glengarry mine, having an 800' shaft, has the mineral rights to 108 town lots in Butte.

Miscellaneous claims, slightly developed or practically virgin, owned in whole or part, include the Little Ida claim, area 1 acre; Nightingale, area 1.3 acres; Sweitzer, area 3.5 acres; Highland Chief, area 12 acres; Mountain Chief No. 3, Black Diamond, Wild Goose, A. J. P., Hazley, Pompey, Montana, Clifton, Scottish Chief, Lioness, Kinkaid and Taffy.

The Tropic shaft on one of the most easterly claims of the company was deepened to 700' in 1912-13, to reach ore known to exist at that point.

The Josephine mine, supposed to have a continuation of the Lexington vein, was operated, 1906-1907, by lessees, mainly for silver values, but is idle.

The Greenleaf mine, located east of the proven ore zone of Butte, has a 1,000' shaft, with a hoist good for 2,500'. Mine has about 800' of lateral workings. Work was suspended, July, 1908, but the property is by no means devoid of promise.

The Comanche mine is but slightly developed, and this department has a number of other properties with shallow shafts, on which more or less exploratory work has been done, at various times.

The Southern Cross mine, situated in the Georgetown district, west of Anaconda, purchased 1912, for \$370,800, is a gold property developed by a 400' shaft, equipped, 1913, with electrical machinery, and is to be deepened to 700'. Ore is an auriferous pyrite.

Butte hill is a network of metalliferous veins, with nearly east and west strike, crossed by a number of north and south dikes, some of which are ore bearing for a short distance near their intersection with the veins. The matter of clearly defining apex and extra-lateral rights, under the archaic Federal mining laws, is one of the greatest possible difficulty, and in the past had led to litigation costing millions of dollars, all of which ultimately had to be paid out of the profits from copper produced. In 1912 the mines now owned by the Anaconda were developed by 34.1 miles of new openings, of which 4,736' was shaft sinking.

The mine waters are highly charged with copper and leaching plants have been built at practically all of the big mines merged in the Anaconda. Old scrap iron, tin cans and wire rope are used as precipitating agents, these articles commanding a standard price of 1 ct. per pound. The flow of the water in the precipitation tanks and launders is much more rapid than is the case in the large Spanish lixiviation plants. The principal leaching plant, and the most modern and best planned in the district, is at the Leonard mine. This plant, costing about \$20,000, and treating water from all of the Boston & Montana mines, includes a building for drying and shipping the copper precipitate.

Originally, all of the mines in Butte were operated by steam power, and many of the mines had very extensive steam plants. About 1900, commercial electric current became available from the United Missouri Power Co., and the use of electric power has increased steadily, this offering great advantages over steam in initial cost and flexibility of service. The management has substituted compressed air made in a central station by electric power for steam and uses electricity generally for haulage, lighting and power throughout the mines and works, which has effected a saving of about one-third cent per pound on finished copper—an amount that seems small, measured by the pound, but which, on the maximum productive capacity of the Anaconda, reaches the sum of about \$1,000,000 yearly.

The new air compression plant at the Leonard mine is the most extensive in the world, and is now in full commission. The controller house at the Leonard was doubled in size, 1910, and has transformers in fire-proof compartments. The new air compression plant, built as the first unit for a plant of double the present size, has three 1,200-h. p. Nordberg air com-

pressors, each with a capacity of 7,500 cu. ft. of free air per minute. A building 300' long contains 25 receivers, each 10x30' on the ground, for the compressed air, this air-storage plant having reserve power for 8 hours. In connection with this plant is the largest steel water tank in the world, 100' in diameter. The hoists at the Mountain View, High Ore and Diamond mines are operated by this plant, and eventually all hoists at all mines will be so operated. The present electric-pneumatic power plant cost about \$1,000,000.

Electric power is brought from Canyon Ferry, near Helena, 70 miles distant, current being wired to the mine with a primary voltage of 50,000 volts, reduced to 2,000 volts in a transformer station, just outside of Butte, power being distributed to the various workings from a main station at the Never Sweat mine, the current being used at 440 volts.

Power from the plants in Broadwater county being found inadequate, current was brought, June, 1910, from Great Falls, a distance of 130 miles.

The hydro-electric power installations on the Missouri river, in the vicinity of Great Falls, include the Black Eagle Falls and Rainbow Falls plants. The Black Eagle Falls plant has a 42' effective head, generating 8,700 h. p., except at the lowest stage of water, and also includes a 3,000-h. p. auxiliary steam plant.

The Rainbow dam, 4 miles below the Great Falls smelter, completed 1910, at a cost of about \$1,500,000, is of heavy timbering, concrete and rock, 26' high and 1,200' in length, generating a minimum of 30,000 and a maximum of 40,000 h. p., and transmits current at a voltage of 100,000. Power for Anaconda, as well as Great Falls and Butte, is furnished from this plant.

The Washoe sampler was burned July, 1910, and has been rebuilt, of reinforced concrete, with capacity of about 1,600 tons daily.

The Butte Reduction Works, formerly owned by the Colusa-Parrot Mining & Smelting Co., were destroyed by fire, 1912. The smelter, which was fully described Vol IX, under title of Colusa-Parrot, has been dismantled.

The Washoe Reduction Works, near Anaconda, 28 miles from Butte, cost upwards of \$10,000,000, and treat 10,000 to 12,500 tons daily. The plant covers about 240 acres, 2 miles east of Anaconda. The Washoe plant was designed by Frank Klepetko, and built and equipped with the able assistance of Messrs. Mathewson, Repath and Gulberg. Smelting was begun Feb., 1902, since which time numerous modifications, improvements and additions have been made. The construction of the original plant required 20,000 tons of structural steel, 25,000,000 ft. of lumber, 1,000 carloads of brick, 15,000 cu. yds. of masonry and 300,000 cu. yds. of excavation. The annual productive capacity of the plant is about 225,000,000 lbs. blister copper yearly, in addition to gold and silver values, the works being one of the largest silver producers in the world, although silver is merely a byproduct. In 1912, the Washoe Reduction Works treated 3,880,203 dry tons of ore and produced 222,763,670 lbs. fine copper, 9,702,604 oz. silver and 52,560 oz. gold.

The sampling mill is in 2 sections, each of 1,800 tons daily capacity. Ore from sampling bins goes to mill bins, is crushed and delivered to bucket elevators. The descending stream of ore is cut four times by Brunton automatic samplers, each taking 20%, giving a final sample of 3.2 lbs. per ton of ore. The sample is reduced further by a Brunton quartering shovel, then dried on a steel dryer, ground by an Engelhart sampling grinder, bucked to pass through a 100-mesh sieve, and divided into 3 sample packages, one going to the laboratory for analysis and one to the owner of the ore, while the third is filed as a control, in case of dispute.

The concentrator power house is between the two halves of the con-

centrator proper. It is of steel with brick walls and holds three 15-ton traveling cranes of 44' span. Equipment is electrical, but includes a steam plant of two 4-cylinder triple-expansion condensing engines of 3,300 indicated h. p. at 200 lbs. steam pressure, but runs at 150-lbs. pressure, developing 1,750 h. p. each, with an 1,150-h. p. 4-cylinder triple-expansion engine held in reserve as an auxiliary. Electric power is received from Helena, Great Falls and Flint Creek falls, 22 miles west of Anaconda.

The concentrator consists of 2 buildings, 255x350', each containing 4 complete sections, or 8 in all. Each section contains a 12x24" Blake crusher, two 7x10" Blake crushers, 6 Hartz jigs for coarse concentrates, 1 set of 15x42" coarse rolls, 1 set of 15x42" fine rolls, 36 Evans jigs for fines, 1 set of 15x42" rolls for middlings, 18 Evans jigs for middlings, three 6' Huntington mills, 18 Evans finishing jigs and 33 Wilfley tables, with a large number of classifiers, settling tanks, dewatering tanks, elevators and trommels. The crushed ore of 3" size passes through 2 sets of trommels for sizing, oversize material going thence to 2 smaller crushers, which reduce it to 1½" size. Two belt elevators take this material to a series of trommels for coarse sizing, oversize going to coarse jigs which produce coarse concentrates for the blast furnaces. The waste from the coarse jigs goes to 2 sets of 15x42" rolls for crushing, and is thence elevated and rejigged. In the jigging department all undersize material from crushers is treated automatically.

The jigging sections have Evans jigs in 3 double rows, with Evans hydraulic classifiers making 3 sizes of concentrates, which go to the storage bins, while middlings go to the middling department, where 2 sets of 15x42" rolls crush the material to about 1¼" size, this going by belt elevators to 4 sets of trommels, from which the undersize goes automatically to 4 hydraulic classifiers, which feed 18 double Evans jigs, set in a triple row. Middlings are collected in launders, and taken by elevators to the regrinding department, where three 6' Huntington mills are fed from V-shaped tanks, the ground material passing through 1¼" screens to hydraulic classifiers, thence to the jigs, both concentrates and tailings being carried by water, in launders. The slimes department has 33 Wilfley tables, fed from the bottoms of V-shaped tanks, concentrates being washed in launders to the settling tanks, at the foot of the concentrator building. Tailings carry an average of about 0.7% copper and 90% silica.

One section of the concentrator of the Washoe Reduction Works was remodeled, 1912, the Great Falls system of concentration supplanting that previously used and resulted in an increase in both tonnage and saving of copper. A remodeling of the entire plant is expected in 1913-14.

The tank house contains 9 settling tanks for each section, each tank being 19x19x15', with a capacity of 420 tons. Each section has 6 tanks for the first settlement of concentrates, and 3 for the overflow, the resulting overflow going to final settling tanks whose overflow goes to a slum pond, together with all slum water from tanks and Wilfley tables. The product of the first settlement tanks is known as fine concentrates, that of the second tanks as second settlement concentrates, and that of the third series of tanks as tank slum. The fine and second settlement concentrates are treated in the roaster building, and the tank slum goes to the briquetting plant.

The roaster building contains 64 McDougal calcining furnaces of the Evans-Klepetko type. Each furnace is 16' in diameter and 18' high, with 6 hearths having revolving water-cooled shafts and arms driven by top gearing, rabbling arms being so set as to move material from circumference to center, and vice versa, on alternate hearths, until the material drops from the lower hearth into 2 calcine hoppers under each furnace, beneath which run the railroad tracks, hopper cars transporting calcines to the

reverberatory building. No fuel is required, except occasional fine coal for charging a cold calciner. Gases are drawn through brick flues into 40x40x300' brick and steel dust chambers having concrete inner walls, where much of the flue dust settles. The dust chamber has a series of hoppers, underneath which are railroad tracks, flue dust going direct to the reverberatory furnaces for smelting. The crusts adhering to the rabbling arms and shafts are barred off and sent to the blast furnaces. In charging the roasters, finely-crushed limestone and screenings from first-class ore are admixed, in the feed hoppers, for the purpose of producing a balanced charge for the reverberatories. The capacity of each calciner is 45 tons per day.

The reverberatory plant is in two buildings, each containing 4 coal-fired furnaces with hearths 19' wide and from 102 to 116' in length, with grate area of 8x16', having a smelting capacity of 300 tons daily, on natural draft. Fuel is Wyoming coal, dumped into hoppers having 4 discharges directly above the fire-box. The flames, after leaving the furnaces, pass through two 375-h. p. Stirling boilers, in tandem, reducing the temperature of the gases to about 600° F. when reaching the main flue, and securing about 600-h. p. from the waste gases. Ashes and partly-burned coal drop from the fire boxes into launders carrying them over a grizzly, the larger pieces of ash going to the slag sluice, while the smaller pieces, containing unburned coke and coal, are sluiced to the coal washery.

Slag is skimmed from the reverberatories, at 4-hour intervals, into a stream of slum water, which granulates and sluices it, through a launder with cast-iron lining, to the slag dump. By allowing slag to accumulate until 3 or 4" above the skimming plate, it is possible to skim the furnace very rapidly, 60 tons of slag being skimmed in 20 minutes. Matte is kept some distance below the skimming plate, rendering it impossible to pull out any of the matte, thus obviating explosions. Matte is tapped from the side of the furnace through copper tap-hole plates, and run through cast-iron launders, lined with silicious material, to 10-ton hot-metal ladles that go by tram to the converters. Fire brick used in the reverberatories are made by the company's brick plant, bricks being 3x6x15" in size. Bridge walls and sides are luted with clay every 30 days, when necessary. Bridge-wall plates are kept cool by the circulation of air through pipes connecting with the main flue. Fumes from the reverberatories are taken through underground flues, 1 for each row of furnaces, to the main flue. Flue dust is not briquetted, but is treated in reverberatories with fines. The reverberatory department has given exceptionally satisfactory results, effecting an increase of about one-third of the normal smelting capacity, a reduction of about one-third in fuel charges, saving about 10% of unburned fuel in the coal washery, reducing labor costs and securing about 600-h. p. of energy from the waste gases.

The briquetting plant occupies a 55x192' frame building containing 4 Chambers end-cut auger-type briquetting machines, each of about 700 tons daily capacity, 2 machines usually being sufficient to handle all material. Briquettes are made of fine concentrates, fine first-class ore and pond slums, mixed with crushed coke and coal from the coal washery. Materials are brought from storage bins by belt conveyors to a pug mill, whence they are discharged into the briquetting machines, where further mixed and forced through a former in a continuous bar, which is cut into 10-lb. briquettes by a revolving cutter. Briquettes are taken by a series of belt conveyors to storage hoppers, whence loaded into charging cars for the blast furnaces.

The blast furnace plant has the usual 3 floors, the uppermost for rail-

road tracks, the lower the main operating floor, and middle the charging floor. The original furnaces of 56x180" section at the tuyeres, and 40' high, of about 400 tons' daily capacity each, have been made into 3 furnaces by building connections between, 2 of the 3 furnaces being 51' in length, while the third is 87' long, with a uniform width of 56" at the tuyeres. The two 51' furnaces have a maximum capacity of 1,800 tons each, and the 87' furnace has smelted 3,100 tons in 24 hours. It is possible to repair one end of any of these furnaces while frozen, with full smelting in progress at the other end.

The large blast furnaces of the Anaconda mark perhaps the most important step taken in copper smelting since the invention of the bessemer process of copper conversion. The bottom of the center of each furnace is of silica brick, laid on water-cooled cast-iron plates mounted on cast-iron columns, with a gradual slope to each discharge spout. The 87' furnace has 3 discharge spouts and three 16' settlers, with 150 four-inch tuyeres, the 51' furnaces having 88 four-inch tuyeres and two 16' settlers each. The credit for these gigantic furnaces is due to Mr. Mathewson. Among the advantages are increased hearth area, with but 2 ends to hold crusts, while crusts forming on the sides can be disposed of by permitting the furnace to run down, in which case the crust will drop, or, if necessary, can be barred. The large furnace has a smaller radiating surface for the same hearth area, requires less fuel, and may be repaired rapidly while in blast. Leaking water jackets may be replaced in 6 to 8 hours. Each 51' furnace has three 7' 45° unlined steel flues, with 5 similar flues on the 87' furnace.

The charging floor has railroad tracks on either side of the furnaces, side-dumping hopper cars being handled by compressed-air locomotives. The charging doors extend full length, and are opened and closed by compressed-air pistons, all charges being fed automatically. In front of each furnace are 16' settlers, receiving a continuous flow of molten matte and slag, matte being drawn from the bottom into 10-ton hot-metal ladles, going thence to the converters, while the slag skims into sluices and is granulated and washed to the slag dumps by running water. Overhead steel flues carry fumes and smoke into a dust chamber, exactly duplicating that in the calcining department, which connects with the main flue. The product of the first fusion is a 44% matte, with slags averaging about 0.2% copper only. A charge train consists of 18 cars, receiving material by weight from the storage bins adjacent to the blast furnace building. These bins, of wood, are in 3 rows, each row being 28' wide, 20' deep and 786' in length, divided into bins of various sizes, providing storage for first-class ore, coarse concentrates, limestone, coal, silica, etc. All bin gates are operated by compressed air. Two charge cars carry a charge ranging from 8,400 to 11,000 lbs., according to composition.

The converter building has two 60-ton 60' span electric traveling cranes for handling converter shells and ladles with two 15-ton auxiliary electric traveling cranes in the casting department for general use, one of the larger cranes handling copper and slag from the converters, and one handling shells for relining. Matte from both blast and reverberatory furnaces is brought to the charging floor of the converter building, which is 23' above the operating floor, and is poured from ladles into a launder, the end section of which is so pivoted that it can be turned out of the way when the converter shell is filled, the shell being filled while in a nearly vertical position, with air on. The matte is blown to low-grade blister copper and poured into a sheet-steel clay-lined ladle, which is taken by crane to a hydraulic cradle, from which it is poured into the casting furnace. The 3 casting furnaces are of 95-ton and 110-ton capacity. Copper is poured in at the

side, and when charged to 50 or 60 tons, oxidation is begun by a 90-lb. air pressure. When the furnace is full, slag is removed and oxidation is complete, the charge then being poled to the desired pitch, and cast in a machine with a platform conveyor having molds attached, operated hydraulically. Molten copper is run into a suspended ladle, from which it is poured by hydraulic power into anode plate moulds. When the mould is filled, the ladle is dropped to a horizontal position, and the next mould is brought into position, and the process repeated. Capacity of the casting machine is 25 tons hourly. The cast copper is chilled by a spray, and dumped from the moulds upon a platform conveyor running through a tank of water, then trucked to the scales, weighed, marked and shipped. The product assays about 97% copper and 80 ozs. silver per ton.

Coal ashes from the reverberatory department are sluiced to the coal washery, which has a complete jigging equipment that saves about 35 tons daily of coal and coke, which is ground and sent to the briquetting department, where it is mixed with other material and bricked.

The flue system is cleverly planned and highly efficient. There are 3 principal flue lines, from the roasting department, blast furnaces and reverberatory furnaces, each being 20' wide and 15' high, built of brick and steel. The converter department has two 7x7' flues. The blast, roaster and converter flues connect with their respective dust chambers, while the reverberatory flue leads direct from the furnaces. Lengths of the flues are as follows: Blast flue, 1,653'; reverberatory flue, 842'; converter flue, 703'; roaster flue, 488'. These flues converge into one main flue, which, for the first 1,200' of length, is 60' wide, with side walls 20' in height, the bottom being excavated at an angle of 30° from horizontal. The roof is of I-beam and brick arch construction. For the balance of distance to the stack, 1,122' the main flue is 120' wide, having a roof of No. 9 sheet steel. The main flue leads to a brick stack 300' high, with inside diameter of 33' 4" at the bottom and 30' at the top, with a thickness of 4' 6" at the bottom, requiring 3,000,000 brick in its construction, with the top of the stack 932' above the valley. Underneath the main flue is a tunnel 7' high and 55' wide. Flue-dust is drawn off through hoppers, placed at intervals of 10', into cars operated by gravity from a set of drums located at the stack. Loaded cars are taken from the end of the main flue and elevated to 2 sets of flue-dust bins adjacent, one set taking arsenical flue dust while the other receives flue dust that is to go direct to the reverberatories.

Arsenic is recovered from flue dust in a plant treating about 60 tons of dust daily. The flue dust is taken from the bins by inclined revolving pipes, leading to the feed hoppers of 2 Brunton revolving-hearth roasting furnaces. Fumes from these are conducted through 240' of zigzag flue having about 40 cells, the cooling of the fumes subliming the arsenic on the walls. At intervals roasting is suspended, and the sublimated arsenic is scraped from the walls of the cells and taken to a small reverberatory furnace, fired by coke, and resublimed in a similar zigzag flue. The first product is a 90% arsenic sesquioxide, and the final product a 99.8% arsenic sesquioxide, which is ground, barreled and shipped.

The smelter power house has a 15-ton electric traveling crane running the entire length of the building. There are 10 Connorsville blowers, direct-connected to Corliss engines, each with a capacity of 300 cu. ft. of free air per revolution, compressed to 40 ozs.; 6 air compressors with an aggregate capacity of about 2,500,000 cu. ft. of free air per hour, compressed to 16-lb. pressure; three 90-lb. air compressors for general use, and four 900-lb. air compressors furnishing air to the locomotives of the tram line. Four hydraulic compressor pumps and accumulators raise water to a pressure of

360 lbs. per square inch, for the hydraulic apparatus of the converter stands, and for various other uses. Steam is supplied from the waste-heat boilers in the reverberatory building, and from twelve 300-h. p. Stirling water-tube boilers, in a boiler room at one end of the power house. The steam plant, under normal circumstances, is merely an auxiliary to the electric power used throughout the works.

The local transportation system of the Washoe works includes 48 miles of standard-gauge railroad tracks, equipped with 17 Porter air locomotives, of 12 to 22 tons weight each, and 240 cars. The air receivers of the locomotives are charged at 900 lbs. pressure, cut to 150 lbs. pressure at the cylinders by reducing valves. There are charging stations at frequent intervals, fed by an extensive system of high-pressure pipes. Locomotives are recharged about every 20 minutes, 2 minutes being required for the work. The tram system handles about 13,000 tons of material daily.

The laboratory sampling mill, of brick, cares for all metallurgical samples taken throughout the works, there being about 9,000 samples of different kinds of material monthly.

The laboratory, of brick and stone, 2 stories high, is one of the most thoroughly equipped at any metallurgical plant. All samples taken in the works and at the sampling mill are sent to this department for analysis, there being about 15,000 actual determinations monthly, for copper, gold, silver, iron, zinc, sulphur, alumina, silica, etc. There are also testing and photographic departments in the basement of this building.

In addition to the departments described, there are smithy, boiler, machine, carpenter and electric repair shops and large foundry and machine shops at Anaconda, about 2 miles from the smelter, doing new work and heavy repairing, in addition to a general custom business.

The general office building, of brick, also contains a large telephone exchange, with a private system connecting all departments of the works, with long-distance connections for Butte, Helena, Great Falls and other Montana points, and private telegraph wires connecting with the Western Union and Postal companies at Anaconda.

The amount of water required by the Washoe works, when in full operation, is about 35,000 gals. per minute. Water is stored in Storm lake and Silver lake, about 15 miles west of Anaconda, water from both creeks and lakes being gathered by a dam, about 4 miles west of Anaconda, and diverted to the works in a 5x7' flume, 7 miles long.

Much trouble has been experienced by the Anaconda Co. through damage suits, because of fumes thrown off by the smelter, and large sums have been paid to farmers in the Deer Lodge valley, in liquidation of such claims, some of which were genuine, while it is equally certain that a large number were brought by professional "smoke farmers." The new stack, on the top of a high hill, and the installation of the arsenic plant, have greatly reduced the percentage of solids in the smelter smoke. The Federal Forestry service also took part in the proceedings, but Judge Hunt decided, Jan. 25, 1910, that there had been some damage from arsenic, but no appreciable damage from sulphur fumes. Despite this decision the government sent experts to take samples of the soil, vegetation, grains, trees, etc., and the Anaconda Co. did similarly. The government again brought suit against the Anaconda, March 18, 1910, alleging that a tract of approximately 1,000 square miles, in 5 counties, has been damaged by fumes, placing the damage to standing timber at a figure that seems ridiculous to all who know the quality of the timber in that vicinity. The government asked a permanent injunction, and that the company be compelled to operate its plant in such manner as to end the destructive sulphur and arsenic fumes. This injunc-

tion has been denied by the Federal court. The government also claims that damage has arisen from the pollution of water in streams by the Washoe works, and the government experts suggested that the plant turn its sulphur fumes into sulphuric acid, and make superphosphates therewith, but it is difficult to see where this suggestion offers any solution of the problem. It is commercially impossible for the Washoe works to turn its sulphur fumes into sulphuric acid, and find a market therefor, owing to the immense quantity of acid that would be made if all of the fumes were turned into that product—an output of acid that would swamp the markets of North America, if not of the world.

In concluding a description of this wonderful metallurgical plant, which is the largest in the world, it is but justice to give credit to Messrs. Mathewson, Repath and their able assistants for the great technical skill and executive ability that are manifested, in a remarkably high degree, in every department.

The Great Falls smelter, at Great Falls, Mont., 172 miles northeast of Butte, receives ore over the Great Northern railway, at a freight charge of 75 cts. per ton. This plant, opened 1891, with a capacity of 1,000 tons daily, now has a maximum capacity of nearly 5,000 tons daily. The smelter treats, normally, about 400 tons daily of ore, and the concentrates from 2,500 to 3,000 tons of ore treated in the concentration mill. The works treated 1,189,039 dry tons of ore in 1912, yielding 71,710,491 lbs. fine copper, 1,312,132 oz. silver and 8,750,576 oz. of gold.

The concentrator, second only in size to the monstrous Washoe plant, is in 6 sections, each a complete mill in itself, the 6 having a total capacity of 2,700 tons daily. The building, of wood, is equipped with six 10x20" and twelve 5x12" Blake crushers, 16 Huntington mills, 18 rolls, 317 sieves, 68 Hartz jigs, 249 Evans jigs, 5 Overstrom tables, 42 Wilfley tables, 10 six-foot vanners and 50 four-foot vanners.

The smelter equipment includes 22 McDougal calciners and five 500-ton water-jacket blast furnaces. There are seven 175-ton reverberatory furnaces. The converter department has 12 stands with a new type of cylindrical basic-lined shell 20' in diameter, replacing the old 12' Great Falls type previously used. Product is blister copper of about 99% tenor, including about 40 oz. silver and 0.25 oz. gold per ton.

The smelter being antiquated, despite frequent remodeling, an entire new plant is now in course of erection. The old stack flues and blast furnace will be utilized, but the rest of the plant will be dismantled.

A new smokestack, built 1908, at a cost of about \$250,000, is the largest in the world, and effects a saving, in flue dust, of about \$150,000 yearly. This stack is set on a foundation 38' deep and 97' in diameter, composed of 10,000 tons of concrete. The stack is of 506' height, 78' 6" outside diameter at base and 53' outside diameter at the top, weighing 16,600 tons. Material of stack is perforated segmental brick, slightly shaped to fit the curvature of the stack, equivalent in contents to 5,700,000 common brick. The stack has a sectional lining, and is capable of carrying about 4,000,000 cu. ft. of gases per minute, its capacity being equal to any possible increase in the works. A new flue, connecting the smelter and stack, has a 125x175' dust chamber and a 1,450' flue section 48' wide and 28' high.

The electrolytic plant has a capacity of 70 tons of refined copper cathodes daily, gold and silver slimes being reduced in a separate refinery. Equipment includes 3 furnaces for melting cathodes and for casting refined copper into wire bars and cakes. A considerable portion of the blister copper from the smelter is, however, sent for refining to the Raritan works, at

Perth Amboy, N. J. Current for the electrolytic tanks is carried by solid overlapping slabs of copper.

Extensive fuel tests, made 1910, proved that Great Falls coal was available for smelting use, which was not believed formerly. In 1912, the Great Falls works treated 1,189,039 tons of ore.

Coal lands of the Anaconda are extensive, including the former holdings of the Diamond Coal & Coke Co.; 1,900 acres of coal lands on Bear creek, near Red Lodge, Carbon Co., Mont., formerly held by the Washoe Copper Co., coal lands at Sand Coulee, 16 miles from Great Falls, formerly held by the Boston & Montana, and coal mines at Belt, Cascade Co., Mont., owned for some years by the Anaconda.

The lands formerly owned by the Diamond Coal & Coke Co., at Washoe, Carbon Co., Mont., are 13,280 acres, on which mines Nos. 1, 2 and 4 have developed, and partly worked, 1,220 acres. Of the remaining 11,780 acres, 1,120 acres are above the coal outcrop, and 3,000 acres are considered too deep to work, leaving 7,660 acres of coal lands yet to be developed and worked. The property is estimated to contain 73,500,000 tons of coal.

The coal mines formerly operated by the fuel department of the Anaconda, at Belt, Cascade Co., Mont., were closed down, 1913, the acquisition of coal mines in Wyoming and eastern Montana affording a better quality of coal and at less cost.

The lumber operations of the company include the property and business taken over from the Big Blackfoot Lumber Co., which previous to 1909 was known as Big Blackfoot Milling Co., and the timber lands and mills, owned by the Anaconda previous to the merger, at Hamilton, Mont. The timber lands taken over from the Big Blackfoot were upwards of 1,100,000 acres, estimated to contain approximately 6 billion feet of standing timber. The Big Blackfoot property includes 4 mills, known as the Bonner, St. Regis, Hamilton and Hope, which, in 1912, manufactured 73,541,349' of lumber, board measure, of which 1,044,856' were used at the mills; 54,189,160' were sold and 65,560' went into stock. Tributary to the Bonner plant is a broad-gauge railway, at Camas Prairie.

The Anaconda Co. owns a controlling interest in the Butte, Anaconda & Pacific Railway Co., which, in 1912, transported 265,829 passengers and 5,715,540 tons of ore and freight, with gross earnings of \$1,259,170.43, and net income of \$104,432.74, from which a 3% dividend was paid on the capital stock of \$1,000,000, leaving a surplus profit for the year of \$74,432.74.

Miscellaneous enterprises of the Anaconda Co. include brick plants at Anaconda and Great Falls, manufacturing mainly silica brick from local material, the refractory products of this plant ranking among the best. The company also owns the Montana Hotel at Anaconda.

The metallic production of the Anaconda is marketed through the United Metals Selling Co., which is owned by the Amalgamated Copper Co.

In its various mines, works and other enterprises, the Anaconda Copper Mining Co. employs directly about 9,000 men, and indirectly gives employment to several thousand additional, being very much the largest industrial factor in the state of Montana, and being practically the sole support of the city of Anaconda, with 15,000 people, and the city of Butte, with a population of 40,000.

Production, since consolidation, was 223,808,546 lbs. copper, 8,053,327 oz. silver, 45,179 oz. gold in 1910; 259,407,093 lbs. copper, 9,731,561 oz. silver, 48,949 oz. gold in 1911; 294,474,161 lbs. copper, 11,014,736 oz. silver, 61,314 oz. gold in 1912. Production, Jan. 1 to Aug. 1, 1913, was 158,300,000 lbs. copper, compared with 173,800,000 lbs. in 1912.

ANCHOR MINING CO.

Idle several years. Office: Calumet, Mich. Mine office: Myton, Wasatch Co., Utah. John D. Cuddihy, vice-pres.; F. W. Taylor, sec.-treas.; and Henry L. Baer, directors. Organized June, 1908, under laws of Michigan, capitalization \$150,000, shares \$25 par; issued 1,800. Annual meeting, second Tuesday in June. Lands, 9 claims, patented area 131 acres, in the Snake Creek district, one-half mile south of Daly-Judge mine, near Park City. Company is the successor of the Wolverine Mining Co.

ANCHORIA COPPER MINING CO.**UTAH**

Idle several years. Office: 55 High St., Oshkosh, Wis. Mine office: Copperton, Carbon Co., Wyo. Hon. David H. Craig, pres.; H. O. Granberg, sec.-treas. Organized April, 1901, under laws of Wyoming, capitalization \$1,000,000, shares \$1 par. Lands, 4 claims, area 80 acres, patented, in the Battle Lake district, developed by a 200' shaft and tunnels of 45' and 60', showing an orebody estimated at 45' width, giving average assays of 17% copper, and from a trace to \$5 gold per ton. Has a 40-h. p. steam plant, with hoist good for 500', 3 power drills and 4 substantial mine buildings of logs.

ANDERSON-APACHE COPPER CO.**WYOMING**

Idle. Mine office: Hachita, Grant Co., N. M. Hon. Geo. H. Neale, pres.; Harry Duey, vice-pres.; Chas. H. Howe, sec.-treas.; Arthur Houle, cons. engr. Organized June 1, 1907, under laws of Arizona, capitalization \$500,000, shares \$5 par. Holds lands under a \$100,000 bond and lease, with \$20,000 paid.

Lands, the Apache mine, 5 claims, area 100 acres, 5 miles southeast of Hachita. Mine, opened 1883, was worked continuously until 1907, by leasers, producing approximately \$200,000. Property shows contact deposits between porphyry and Carboniferous limestone, carrying bunches of oxidized ore, chalcocite and chalcopryite, ores being oxidized to present depth, and running 4 to 30% copper, but estimated by company to average 10% copper and 20 oz. silver per ton, which seems high. Development is by a 300' shaft, with 3,500' of workings, said to show 250,000 tons of ore, with about 40,000 tons blocked out for stoping, which estimates are considered high. Equipment includes a 25-h. p. Fairbanks & Morse gasoline hoist. Shipped a little ore, 1908, to Copper Queen smelter, giving net smelter returns of about \$17 per ton.

ANDERSON GROUP.**NEW MEXICO**

Address: Luning, Esmeralda Co., Nev. Property, 5 claims, 4½ miles east of Luning and adjoining Nevada Champion Copper Co. ground. Development by tunnels. Shipping 20 tons daily from glory hole, July, 1913. Property under lease and bond to Mason Valley Mines Co.

ANGLO-NEWFOUNDLAND DEV. CO.**NEVADA**

Address: Grand Falls, Newfoundland. Mining properties transferred to Terra Nova Properties, Ltd., 1912.

ANITA COPPER MINES CO., S. A.**NEWFOUNDLAND**

Office: Fundicion, Sonora, Mex. Geo. M. Ryali, pres.; T. C. Kirkland, asst. gen. mgr. Organized 1904, under laws of Mexico, and now controlled by Pacific Smelting & Mining Co.

ANNIE MINING CO.**MEXICO**

Mine office: Jelm, Albany Co., Wyo. L. A. Hancock, sec. Organized 1903, under laws of Wyoming, capitalization \$250,000, shares \$1 par. Lands, 100 acres, near Jelm, said to show two 4' contact veins between granite and schist, opened by a 140' shaft and a 138' tunnel, showing copper carbonates and bornite, assaying up to 20% copper and \$10 gold per ton. Idle since 1907, except for representation work performed each year.

WYOMING

ANTELOPE GOLD & COPPER CO.

CALIFORNIA

Probably dead. Mine at Loyalton, Sierra Co., Cal. No trace of operations secured.

ANTELOPE MINING CO.

UTAH

Mine near Eureka, Juab Co., Utah. Lewis Pratt, owner. Organized March 31, 1909, under laws of Utah, capitalization \$15,000, shares 5 cts. par, assessable. Lands, 3 claims, showing a vein said to carry copper ore developed by an 80' shaft and tunnel. Developing, June, 1913.

ANTELOPE MINING & MILLING CO.

CALIFORNIA

Probably out of business. Mine office: Clio, Plumas Co., Cal. C. E. Christman, pres.; Henry Rosser, treas.; Robt. Dilworth, sec. Organized under laws of Arizona, capitalization \$1,000,000, shares \$1 par. Lands, 6 claims, in 2 groups, carrying considerable timber and having a vein of 2 to 4' width giving assay values of \$15 to \$22 per ton, mainly in gold and silver.

ANTELOPE PEAK MINING CO.

ARIZONA

Mine office: Wilkelman, Gila Co., Ariz. M. A. Meyers, supt., at last accounts. Property, opened to shallow depth by a shaft, has a small steam plant. Ores are copper, silver and gold. Was making small shipments of ore, late 1912.

ANTELOPE SPRING MINING CO.

NEVADA

Office: 76 Continental Bank Bldg., Salt Lake City, Utah. Mine office: Humboldt House, Humboldt Co., Nev. Wm. H. Fitch, pres.; Gust Holm, vice-pres.; John W. Geiger, sec. and mgr.; Allen C. Eakin, treas.; preceding officers, Edith M. Brounzell, Fred Hubbard and E. R. Reitsch, directors. Organized April 11, 1906, under laws of Utah, capitalization \$300,000, shares \$1 par, assessable; 8 assessments levied, amounting to 13 cts. per share.

Lands, 22 claims, unpatented, 15 miles from Humboldt House, developed by an 800' tunnel and an 80' shaft, with about 1,900' of workings, showing argentiferous lead and copper ores, reported by management to average 2.76% copper, 16.45% lead, 12.9% zinc and 32 oz. silver per ton.

ANTERO MINING CO.

COLORADO

Idle. Office: Salida, Chaffee Co., Colo. C. W. Budd, pres.; A. R. Rose, vice-pres. and supt.; John Burmeister, sec.-treas.; preceding officers, B. E. Nefzger and W. L. McKelvey, directors. Organized under laws of Colorado, capitalization \$1,000,000, shares \$1 par.

Lands, known as the Tip Top group, are on the northeast slope of Mount Antero, in the Chalk Creek district, 4 miles from the Gunnison branch of the Colorado Southern railroad, and 25 miles northwest of Salida. Property has a vein of 12 to 12' width, with a claimed average of 6', carrying mixed sulphides and oxidized ores, with assay values in copper, gold and silver, up to \$120 per ton. Property also has a vein 60' from and apparently parallel with the main vein, carrying copper, lead and zinc sulphides, and also has various smaller veins.

ANTIGUA COPPER CO.

MEXICO

Idle. Office: 201 Ward Bldg., Battle Creek, Mich. Mine at La Noria, via Alamos, Sonora, Mex. H. A. Clapp, gen. mgr.; D. H. Livingston, supt.; A. W. Davis, treas. Organized 1906, as successor of Sonora Mining Co. Lands, 261 acres, showing contact fissures between granite-porphry and limestone, carrying copper, lead, silver and gold values, mainly in sulphide ores. Has 5 shafts, deepest 105', and about 700' of tunnels, longest being the Margarita, 340', showing 4 veins, having claimed average widths of 3', 10', 12' and 15', said to give average assays of 6.8% lead, 17 to 30 oz. silver and \$1 to \$2 gold per ton, from oxidized ore. Company claims that its gold, silver and lead will leave the copper without cost, as a byproduct. Was not regarded favorably by Horace J. Stevens.

APACHE CONSOLIDATED COPPER CO.**ARIZONA**

Mine office: Globe, Gila Co., Ariz. Hon. John I. Mullins, pres.; F. S. Pfister, vice-pres. and gen. mgr.; Chas. T. Martin, sec.; E. M. Hurd, treas.; preceding officers and Joseph Pfister, directors; Frank Pfister, mine supt. Organized May, 1906, under laws of Arizona, capitalization \$2,000,000, shares \$1 par; issued, \$1,200,000.

Lands, 15 claims, unpatented, area 300 acres, in the Richmond district, about 12 miles from Globe, showing fissure veins and contact deposits between limestone and quartzite, of which 1 vein, of about 5' width, is traceable about 1,200'. Mine has shafts of 65', 45' and 20', with 6 tunnels, longest 335', giving 719' of workings, showing about 400 tons of ore averaging about 3.5% copper, up to 15 oz. silver, and from a trace to \$2.50 gold per ton. Mine in hands of leasers, June, 1913, who are reported as shipping ore averaging 25% in copper with high iron values.

APACHE MINING CO.**WASHINGTON**

Long idle and probably dead. Mine office: Nespelem, Okanogan Co., Wash. Lands, in the Moses district, are developed by a 100' incline shaft and a 350' tunnel, showing ore with a high-grade footwall paystreak and quartz gangue, main orebody carrying 2 to 3% copper and about 5% lead, with some antimony and zinc, and occasional high values in gold and silver.

APEX COPPER CO.**COLORADO**

Office: 304 Colorado Bldg., Colorado Springs, Colo. Mine office: Hayman Park Co., Colo. Officers: John K. Vanatta, pres.; J. J. O'Driscoll, vice-pres. and gen. mgr., J. Vanatta, sec. Organized March, 1903, under laws of Arizona, capitalization \$2,000,000, shares \$1 par. Lands, 9 claims, 90 acres, on Apex hill, in the Lower Tarryall district, showing 2 nearly vertical contact veins of 3' average width, between spar and limestone, carrying chalcopryite and bornite assaying 2 to 30% copper, 7 oz. silver and \$1.20 gold per ton, opened by shafts of 50', 120' and 250', and by 4 tunnels of 500' aggregate length. Has a 10-h. p. steam plant, with hoists, and a 7-drill Leyner air compressor.

APEX MINING CO.**NEVADA**

Office: Twin Falls, Idaho. Mine office: Contact, Elko Co., Nev. Robt. Rogerson, pres.; D. C. McEntyre, vice-pres. and gen. mgr.; C. B. Wilfley, treas.; preceding officers, C. O. Longley and C. C. Redford, directors. Organized Sept., 1910. Lands, 28 claims, said to give a good surface showing of ore, assaying up to 15% copper, with some gold. No trace of operations secured.

APEX MINING CO.**WASHINGTON**

James P. Blaine, superintendent, Chesaw, Okanogan Co., Wash. Property, the Ben Harrison mine, showing fissure veins carrying gold-silver-copper ores. Developed by a shaft with gasoline hoist. Property intermittently operated.

APEX MINING CO.**UTAH**

Mine at Eureka, Juab Co., Utah. Jesse Knight, pres, Provo, Utah; Elmer B. Jones, vice-pres.; R. E. Allen, sec.; M. H. Walker, treas.; preceding officers, Lafayette Hanchett, W. Lester Mangum and Amanda M. Knight, directors; Frank P. Schwindler, gen. mgr., at last accounts. Organized Oct., 1908, under laws of Utah, capitalization \$1,000,000, shares \$1 par. On Feb. 10, 1909, company had \$21,125.11 cash on hand. Lands, near the Grand Central mine, are developed by a 3-compartment shaft of 1,325' depth. Equipment includes a good hoist and air compressor.

APOLLO CONSOLIDATED GOLD MINING CO.**WASHINGTON**

Idle. Mine at Republic, Ferry Co., Wash. W. A. Case, supt., at last

accounts. Property is the California mine, carrying auriferous and argen-
tiferous copper and lead ores, equipped with steam power.

APRIL FOOL MINE.**NEW MEXICO**

Situated near Orogrande, Otero Co., N. M. J. R. Hunter, mgr. Prop-
erty developed by two 50' shafts and a tunnel with 30' of drifting reported
to show a quartz ledge 42' wide at the surface. Shipping to El Paso and 1
carload recently said to have run 6.8% copper.

ARADOS COPPER CO.**MEXICO**

Address: 25 Broad St., New York. Mine office: Moctezuma, Chihua-
hua, Mex. Clarence W. Hoyt, president, 35 Congress St., Boston, Mass.

Lands, about 2,000 acres, were taken over, 1910, from Chihuahua Cop-
per Co., Quo Vadis Copper Co., and include a number of adjoining claims
privately owned.

The Chihuahua group has several shallow shafts, and 9 tunnels with
about 1,500' of workings, estimated by management to show several thou-
sand tons of ore. Equipment includes a 25-h. p. hoist, good for 500', and
small Gardner air compressor and necessary mine buildings.

The Quo Vadis and other groups show numerous contact veins between
limestone and porphyry, ranging from 2 to 40' in width, development work
said to have yielded enough ore shipped to pay for machinery in use on
these properties, ore averaging better than 5% copper.

Company plans doing extensive churn drilling and erecting large reduc-
tion plant, and is reported to have the backing of New York interests prom-
inent in the copper industry.

ARAPAHOE COPPER MINING CO.**ARIZONA**

Mine at Oro Blanco, Santa Cruz Co., Ariz. A. B. Kelso, supt.
Property shows a vein with gold-silver-copper ores, developed by tun-
nel workings.

ARAPAHOE GOLD & COPPER MINING CO.**COLORADO**

Mine office: Sunset, Boulder Co., Colo. Organized 1899, under laws
of Colorado. L. D. Longhi, pres. and treas.; J. S. Riggs, sec. Lands, 4
claims and a tunnel site, in the Sugar Loaf district of Boulder county, Colo.
Idle since 1902, except for annual assessment work, done at the personal
expense of the president.

ARCADE MINING CO.**WASHINGTON**

Office: Chewelah, Stevens Co., Wash. A. R. Anderson, supt. Mine is
developed by a 35' shaft sunk in the Nellie S. group. Ores, mainly chalcop-
pyrite, are highly auriferous.

ARCHIPELAGO MINE.**MEXICO**

Owned by the Minneapolis Copper Co., Cumpas, Sonora, Mex.

ARCTIC CHIEF COPPER MINES.**YUKON**

Idle since 1910. Mines at White Horse, Yukon, are fully described
Vol. X.

ARGENTA-DILLON MINING CO.**MONTANA**

Idle. Mine office: Dillon, Beaverhead Co., Mont. A. H. French, supt.
Lands have a vein of 8 to 10' width, giving assays of 3 to 4% copper, 1 to 8
oz. silver and \$5 gold per ton, opened by shaft. The Ferdinand mine,
apparently leased to Argenta-Dillon Leasing Co., is said to show a good
body of lead-zinc sulphides, on the 140' level. Has steam power.

ARGO MINE.**MONTANA**

Office: care Peter Latsch, Helena, Mont. Mine, near Canyon Ferry,
Lewis and Clark Co., Mont., is in the Scratch Gravel hills, and opened many
years ago by Messrs. Martin and Canolle, shows high-grade copper ore,
with iron gangue and small gold values. Equipped with concentrator and
roll mill.

ARGO MG., DRAINAGE, TRANSP. & TUNNEL CO. COLORADO

Office: 79 Milk St., Boston, Mass. Mine office: Idaho Springs, Clear Creek Co., Colo. Chas. C. Parsons, pres.; H. W. Robinson, sec.; R. E. Schirmer, treas. and gen. mgr.; L. S. Stewart, supt. Organized 1893, under laws of Colorado, capitalization \$100,000. Is controlled, through ownership of entire stock issue, by Argo Mining & Tunnel Co., Ltd. Property is the Newhouse or Argo tunnel, described under title of Argo Mining & Tunnel Co.

ARGO MINING & TUNNEL CO. COLORADO

Office: 79 Milk St., Boston, Mass. Mine office: Idaho Springs, Clear Creek Co., Colo. F. A. Schirmer, pres.; John A. Caldwell, sec.; R. E. Schirmer, mgr. Organized 1909, under laws of Delaware, capitalization \$1,250,000, shares \$5 par; issued, \$812,500. Debentures, \$150,000 authorized; \$135,000 issued. Company succeeded Argo Transportation & Tunnel Co., Ltd., which succeeded Argo Tunnel & Mining Co., Ltd., which succeeded Newhouse Tunnel Co., Ltd. Property is the entire stock issue of Argo Mining, Drainage, Transportation & Tunnel Co., which holds direct title to the tunnel.

The Argo or Newhouse tunnel, 21,968' long, with nearly 20 miles of workings, is perhaps the most celebrated mining tunnel in existence. It starts at Idaho Springs and passes under Russell gulch and Quartz hill, with terminus in the Gunnell vein. The tunnel has double tracks, of 18" gauge, laid with 30-lb. rails. For the first 12,000' the tunnel is 9' high and 10' wide, balance being 8' high and 6' wide. Grade is 5" per 100'. The tunnel was begun Jan., 1894, and completed Nov. 18, 1910.

The mines under which this tunnel passes are estimated to have produced about \$75,000,000 in metallic values, and the tunnel cuts sundry veins of ore carrying gold, silver, lead and copper, and several laterals have opened various orebodies of greater or less promise. The tunnel connects with the Gem, Sun & Moon, Old Town, Poso, Saratoga and Gunnell shafts at depth of 1,600'.

ARGO MINING & TUNNEL CO., LTD. BRITISH COLUMBIA

Office and mine: Greenwood, Yale district, B. C. Ole Lofstad, pres. and gen. mgr.; A. S. Black, sec.-treas.; preceding officers, John Williamson, Jerome McConnell and Oscar Hartman, directors. Organized June 10, 1909, under laws of British Columbia, capitalization \$125,000, shares 25 cts. par. Lands, 3 claims, near the British Columbia smelter. The Mayflower claim has shafts of 20 and 40', and two 20' tunnels, showing auriferous quartz. The Starve Out mine has incline shafts of 40, 80 and 115', showing chalcopryrite, galena and native silver, and there is a 300' tunnel, planned to be driven 640'. No recent returns secured.

ARGO REDUCTION & ORE PURCHASING CO. COLORADO

Office: Idaho Springs, Clear Creek Co., Colo. J. Meyer, Jr., pres.; R. E. Schirmer, sec.-treas. and purch. agt.; preceding officers, F. A. Schirmer, C. G. Schirmer, directors. Arthur H. Roller, gen. mgr.; Harry T. Curran, mill supt. Organized July, 1912, under laws of Colorado, capitalization \$150,000, shares \$100 par, fully paid and nonassessable; issued \$112,000.

Property, 2 acres mill site at the portal of the Newhouse, or Argo tunnel, on which a 500-ton mill has been erected to treat custom ores. Process consists of amalgamation, concentration and cyanidation of ores, all of which are purchased on their assay values from samples taken by the manager.

ARGYLE MINING CO., LTD. ARIZONA

Probably dead. Office: 194 St. Vincent St., Glasgow, Scotland. Letter unclaimed at former mine office, Prescott, Yavapai Co., Ariz. A. Mitchell,

sec. Organized Dec. 29, 1900, under laws of Great Britain, capitalization £100,000, shares £1 par; issued, £66,000. Lands, 2 claims, area 40 acres, known as the Examiner and Mineral Hill, near Huron, Yavapai county, Arizona.

ARICHISE COPPER CO. ARIZONA

Office: 50 Broadway, New York, N. Y. Works office: Safford, Graham Co., Ariz. C. M. Skinner, pres.; Jacob Reich, vice-pres.; H. Toensing, sec.; F. Christe, treas.; preceding officers, Hon. Edw. Lauterbach, M. J. Jackson, Chas. Bimberg, Henry Birrell and Herman Ritzau, directors; Jas. E. Carpenter, gen. mgr. Organized Jan. 30, 1907, under laws of Arizona, capitalization \$2,500,000, shares \$1 par, nonassessable; issued \$1,650,000. Annual meeting, second Tuesday in October.

Lands, 20 claims, area 400 acres, known as the Arichise and Esperanza group, 10 miles northeast of Safford, in the Lone Star district, Gila mountains. The Arichise group shows rhyolite and quartz-porphyry, carrying 3 veins on one of which a shaft has been sunk 200' and drifts run in high-grade silver ore. A body of mineralized porphyry 4,000' long has a 370' tunnel driven in it, with a back of about 225'. This porphyry is from a few feet to 600' wide according to report. The Esperanza group is slightly developed by shallow shafts in rhyolite and an 80' crosscut tunnel.

ARIMEX CONSOLIDATED COPPER CO. ARIZONA & MEXICO

Idle some years and apparently moribund. Office: 85 Ames Bldg., Boston, Mass. Letter unclaimed at mine office, Red Rock, Pinal Co., Ariz. Chas. H. Dickey, pres.; C. D. Burrage, sec. Organized 1901, under laws of New Jersey, capitalization \$5,000,000, shares \$25 par. Property includes the Copper Prince group of 30 claims, in the Silver Bell district, Pima county, Ariz., held through Oxide Copper Co.; an 87½% stock interest in the Table Mountain Copper Co., which has 27 claims in the Bunker Hill mining district of Pinal county, Ariz., and a 90% stock interest in the Angang Copper Co., which holds about 400 hectares, known as the Chiranganguo mines, near Zitacuaro, Michoacan, Mex. Neither of the Arizona properties is of apparent promise, but the Mexican claims might be of some value, if properly developed. Company was promoted by Thomas W. Lawson.

ARIO COPPER CO. MEXICO

Probably idle owing to political disturbances in Mexico. Office: 25 Broad St., New York. Mine office: Ario de Rosales, Ario, Michoacan, Mex. Frederick Moser, pres.; Geo. H. Walsh, Jr., treas.; A. P. Stramler, supt. Capitalization \$2,000,000, shares \$10 par. Holds lands through Ario Copper Co., S. A., organized April 13, 1907, under laws of Mexico, capitalization 500,000 pesos.

Lands, 126 hectares, including the Flora, Roma, Bohemia, San Antonio and San Valentin mines, old properties showing silver and copper ores, about 5 miles from the Inguran mines, on the projected line of the Morelia y Tacambaro railway, partly constructed. Principal development is on the Flora and Bohemia mines, with 7 shafts aggregating 500' depth, and 12 tunnels aggregating 2,600' length. La Roma has ore assaying up to 25% copper. Equipment includes steam and gasoline power.

Patzcuaro, 70 miles distant, is the nearest railway point, but company was said, 1909, to plan an electric tramway from Patzcuaro through Ario de Rosales to the Rio Balsas, in the state of Guerrero, a distance of 150 kilometers, but apparently this line remains only an idea. Equipment includes a 10-ton experimental smelter.

ARIZONA ALPHA MINING CO.**ARIZONA**

Office and mine: Kingman, Mohave Co., Ariz. Robert W. Hunt, pres.; Chas. E. Dox, sec.-treas.; O. F. Brinton, gen. mgr.; Thos. McGraw, supt.

Lands, 4 claims, in process of patenting, area 80 acres, in the Cerbat mining district. The mine has 2 shafts, 140 and 80' deep, and 3 tunnels, longest 1,000', with total openings of about 1,500'. Ore is mainly chalcocopyrite, associated with pyrite, sphalerite and galena, assaying 2.5% copper, 7% zinc, 10 oz. silver and about \$2.50 gold per ton. Equipment includes a 10-h. p. gasoline hoist. Production, 1912, was 25,000 lbs. fine copper.

ARIZONA BELMONT MINING CO.**ARIZONA**

Office and mine: Silver Bell, Pima Co., Ariz. Meyer Schamberg, pres. Organized under laws of Arizona, capitalization \$1,000,000, shares \$1 par; issued 700,000. Lands, 16 claims, adjoin the Imperial Copper Co. on the east and northeast.

ARIZONA BLUE BELL COPPER CO.**ARIZONA**

Mine office: Mayer, Yavapai Co., Ariz. Properties were disposed of, apparently on a royalty basis, to Arizona Exploration Co., and company is in litigation to recover certain royalties, in hands of United States court. Fully described Vol. VIII.

ARIZONA BONANZA MINING CO.**ARIZONA**

Mine office: McCabe, Yavapai Co., Ariz. Organized Oct., 1909, capitalization \$1,000,000. Lands, 2 claims, 3 miles north of McCabe, in the Big Bug district, having 140' shaft, said to show some good ore. Equipment includes a 60-h. p. boiler and a 30-h. p. hoist. No returns secured.

ARIZONA-CANANEA MINES CORP.**ARIZONA & MEXICO**

Idle. Office: 70 State St., Boston, Mass. Mine offices: Cananea, Sonora, Mex., and Globe, Gila Co., Ariz. T. E. Otis, pres.; Robt. Brown, vice-pres.; Paul A. H. van Daell, sec.; Geo. N. Hamlin, treas.; preceding officers, Frank N. Stackpole, Harry F. Fay, Wm. Miller, W. E. Marble, Jr., Jas. Gardner and John T. Morrow, directors. Organized Aug., 1910, under laws of Arizona, capitalization, \$5,000,000, shares \$5 par, nonassessable. Stock is listed on the New York and Boston curbs. Federal Trust Co., Boston, and Security Transfer & Registrar Co., New York, transfer agents; State Street Trust Co., Boston, and Security Transfer & Registrar Co., New York, registrars.

This company took over lands formerly held by the Kansas-Cananea Copper Co., Willey-Cananea Copper Co., Miller Mining Co., Ortega Mining Co., S. A., Southwestern Mining Co., Red Cloud Mining Co., Consolidated Gold & Copper Co., Cananea Northern Mining & Development Co., Compania Minera Cuño y Plata and Boston-Miami Copper Co. The financing of these various corporations taken over was marked by numerous incorporations, mergers, holding companies and reconstructions.

Mexican lands are 4,427 acres, carrying considerable timber, located in a fairly compact block, lying 5 to 15 miles south of Cananea, some of the properties adjoining holdings of the Greene-Cananea. The property, as a whole, has about 1 mile of workings, and lands are connected with Cananea by a good wagon road. It is said that about \$300,000 has been expended in development and equipment, at the various properties.

The Ortega group, area 1,151 acres, has an 800' tunnel, showing an orebody claimed to be 230' wide, assaying 2.75% copper, and another vein, of 80' reported width, claimed to average 4% copper. No. 4 Ortega shaft is said to show, at depth of 110', a 10' orebody, averaging 8.8% copper. Ore is mainly chalcocite.

The Huerfano group, area 342 hectares, 6 miles south of Cananea, taken over from Southwestern Mining Co., shows quartz-porphyry, altered

rhyolite and altered limestone, formation being somewhat similar to that of Cananea, with an ore zone of 800' estimated width, opened by shafts of 40, 90 and 410', latter being wet. The mine has about 1,500' of workings, and property shows outcrops of bournonite, said to assay up to 41% copper, 12 oz. silver and \$1.20 gold per ton, which statement is obviously an error, as bournonite carries a maximum of only 13% copper, with about 42% lead.

The Corregidor group of 741 acres, and the Chapultepec group of 789 acres, are adjoining properties, about 6 miles south of Cananea, with formation markedly similar to the Capote mines of the Greene-Cananea. The Corregidor has a 90' shaft, bottomed in material assaying about 2% copper.

The Morita, Escotes, Pelon, Native, Blight, Elena and Residual groups are adjoining properties, having 4 shafts, of 20 to 225', one showing ore giving assays of 11% copper and 30 oz. silver per ton, and in shaft No. 4 there is a 6" stringer of 20% copper ore. These properties have 2 tunnels, one of 1,050' length, cutting, about 700' from the portal, low-grade material giving assays of 4.1% copper. The Morita group and adjoining properties were estimated, Aug., 1910, to have 20,000 tons of low-grade concentrating ore in sight.

The Red Jacket group has an area of about 75 acres. The Refugio group has an area of about 300 acres, and the property taken over from Compania Minera Cuno y Plata was 180 acres.

The San Antonio silver property and El Cobre copper property, in the Sierra Azul, 25 miles southwest of Cananea, have a tunnel, which has yielded ore, in carload lots, returning 176 oz. silver per ton.

The Boston-Miami property, 42 claims, are next south of the Live Oak and Keystone mines, and about one-half mile west of Miami. Property shows a considerable area of schist, granite and porphyry, similar to that of neighboring properties carrying porphyry ores, the mineralized zone apparently extending in a southwest direction through the Miami, Inspiration, Keystone, Live Oak and Boston-Miami properties. Mineralization is along the contact of schist and granite-porphyry, extending into both, and lands show conglomerate underlaid by schist. Development has been exclusively by churn drilling, with 2 Star drills, boring holes up to 900' in depth. Management gives no estimates of average percentage of ore. Buildings include an office, laboratory, warehouse and 13 dwellings. Idle.

ARIZONA-CELTIC COPPER CO.

ARIZONA

Office: 504 I. W. Hellman Bldg., Los Angeles, Cal. Mine office: Clifton, Greenlee Co., Ariz. B. F. Taylor, pres.; D. M. Lynch, vice-pres.; A. G. Shaw, sec.-treas.; preceding officers, R. F. O'Donnell, Archibald Morrison and W. J. Webb, directors. Organized Feb. 20, 1912, under laws of Arizona, capitalization \$3,000,000, shares \$5 par; issued 400,000.

Lands, 37 claims, area 768 acres, and a 1,040-acre mill and smelter site, in the Greenlee Gold Mountain district, showing 3 orebodies, 1 vein of 80' width, said to average 3% copper. Property has been only slightly developed.

ARIZONA CENTRAL COPPER CO.

ARIZONA

Office: 514 Bryant Bldg., Kansas City, Mo. Mine office: Prescott, Yavapai Co., Ariz. J. W. Norton, pres. and mgr.; Geo. F. MacDonald, vice-pres.; W. W. Knight, sec.-treas.; preceding officers, M. M. Rumsey and J. P. Hartnett, directors. Organized May 28, 1902, under laws of Arizona, capitalization \$2,000,000, shares \$1 par, nonassessable; 1,689,000 shares issued. Bank of Arizona, Prescott, registrar. Annual meeting, first Tuesday in March.

Lands, 13 claims, patented, area 273 acres, known as the Shylock

mine, 6 miles northeast of Dewey, 10 miles from Humboldt and 8 miles in an airline south of Jerome. Property, in the Yavapai schist belt, on the western slope of the Black Hills, shows a contact mineral zone of 800 to 1,200' claimed width, between schist and diorite, carrying a gossan underlaid by numerous quartz veins of 12 to 14" width, carrying cuprite, gray copper chalcocite and chalcopyrite. Development is by 6 shafts and 2 tunnels, 300' and 80' long; the deepest shaft is 1,053', sunk at 62°, with a total of 3,525' of workings. Mine also has about 20 pits, of 5 to 20' depth, showing azurite, malachite and chalcocite. The Shylock shaft is said to cut 9 veins, from 1 to 10' in width, giving assays of 2½% copper, 16 oz. silver and \$2 gold per ton.

Equipment includes a 52-h. p. electric hoist, good for 2,000', Temple electric drills and a triplex electric station pump on the 900' level. There are several mine buildings. Property closed, 1912, because of large flow of water but management plans installing pumps.

ARIZONA & CHICAGO MINING CO.

ARIZONA

Formerly at Cave creek, Maricopa Co., Ariz. Described Vol. VIII.

ARIZONA CELTIC COPPER CO.

ARIZONA

Office: 504 I. W. Hellman Bldg., Los Angeles, Cal. Mines near Morenci, Ariz. B. F. Taylor, pres.; D. M. Lynch, vice-pres.; Albert G. Shaw, sec.-treas.; preceding officers, Archibald Morrison, R. T. O'Donnell and G. M. Chartier, directors.

Organized Sept., 1912, under laws of Arizona, capitalization \$3,000,000, shares \$5 par; \$2,000,000 issued for properties, \$1,000,000 in treasury; no bonds, no preferred stock, no debts.

ARIZONA COMMERCIAL MINING CO.

ARIZONA

Offices: 50 Congress St., Boston, Mass., and 188 Middle St., Portland, Me. Mine at Globe, Gila Co., Ariz. Chas. S. Smith, pres.; Harry M. Stonemetz, vice-pres.; C. H. Altmiller, treas.; preceding officers, E. S. Goulston, G. T. Rice and Fred H. Williams, directors. Wm. M. Bradley, clerk; Robert R. Boyd, supt. Organized April 4, 1912, under laws of Maine, capitalization \$1,500,000, shares \$5 par, fully paid, nonassessable; issued, 260,000. Annual meeting July 14. Company is the successor of the Arizona Commercial Copper Co., bondholders of the old company receiving 70 shares of new stock for each \$500 bond held and the stockholders being privileged to subscribe, share for share, for fully-paid stock in the new company upon payment of \$3 per share. Accounts for year ending June 30, 1912, showed cash and loans on hand \$153,000, securities and supplies \$40,000 and accounts payable \$12,600.

Lands, 11 claims, 3 fractional, in 2 groups, known as the Black Hawk and Copper Hill groups, separated by the Iron Cap mine of the National Mining Exploration Co. Lands are in Copper gulch, 3 to 4 miles northeast of Globe, lying just north of the Old Dominion, and adjoining the United Globe and Superior & Boston mines. The property has large bodies of low-grade carbonate ore, but principal values, as developed, are mainly in sulphide ores of medium to high grade.

The Copper Hill group, area 56 acres, carrying the Old Dominion and Copper Hill veins for about 1,500', has 1,200' shaft. The new company has deepened this shaft, opened ore on the 500' level and disclosed 2' of ore, 65' long, between the 600 and 700' levels, and crosscut the vein on the 1,200' level, where it is 40' wide. A recent crosscut from a footwall drift on this vein, 100' from shaft crosscut, shows 5' of 4.7% iron-sulphide ore, from which shipments were made late 1913.

The Black Hawk group, area 97 acres, which carries the Black Hawk and Old Dominion ledges for about 3,000', has a surface capping of low-

grade iron ore, above a 25 to 50' vein, leached to considerable depth, followed by silicious ore, estimated to average about 4% copper, with excess of iron. There also is a hematite vein of 3 to 4' width giving assays of 4.5% copper, with small silver values. The vein is stronger at depth, and carries sulphide ore of 6 to 7% copper tenor. Development is by the 1,030' three-compartment Eureka shaft. Diamond drilling, in advance of the lower workings, has shown good ore, including considerable chalcocite. The mine is decidedly wet, idle, and shaft abandoned.

Equipment at Copper Hill shaft includes a 72' headgear, and a Wellman-Seaver-Morgan second-motion double-drum hoist, good for 1,500' with a Hendrie & Bolthoff auxiliary hoist. Power for the drills and pumps is obtained through an air line and electric power line from the Old Dominion power house.

Buildings include a 32x70' machine shop, well equipped, a 72x75' warehouse, office, hospital and a number of miscellaneous buildings. A 20,000-gal. water tank affords high pressure for fire protection.

The 500-ton smelter, blown in Oct., 1909, has a furnace building and a power house, of steel, also a small sampling mill, with 2,000-ton steel bins for ore and fluxes, and 2,200-ton coke bins. The blast furnace is rated at 500 tons daily capacity, with a dust chamber 32x54' and 28' high, of steel, on concrete foundation, and a 125' smokestack, 8' in diameter. Slags are hauled out by a 10-ton General Electric locomotive, in 3 slag-cars, of 45 cu. ft. capacity each. The 72x80' power house has two 700-h. p. Babcock & Wilcox boilers, a No. 9 Connorsville blower, Nordberg air compressor, 2 Nordberg engines and a 100-kw. General Electric generator. Fuel is petroleum, stored in steel tanks. When in blast, the smelter treated about 250 tons ore daily.

Company has a considerable area of unprospected ground near the Copper Hill shaft and the future of the corporation depends upon favorable development of this area and deeper development in its present workings. The outlook is not unfavorable.

ARIZONA CONSOLIDATED COPPER MINES, LTD. ARIZONA

Sec. and office: H. S. Blake, Throgmorton House, Copthall Ave., London, E. C., Eng. Mine office: Clifton, Graham Co., Ariz. Hon. H. A. Stanhope, Jas. H. Hosking, and C. Ronaldson, directors. Organized June 17, 1899, under laws of Great Britain, capitalization £150,000, shares £1 par; issued, £135,007.

Land, in the Copper Mountain district, bought, 1909, from Continental Finance Syndicate, Ltd., for £135,000 in full-paid stock, are said by company to be the Scioto, Lowland and Chillicothe mines. The claims are said to show a vein that is 2½ to 8' and in places 30' wide, proven for 3,500'. Development by 3 adits; No. 1 in ore for 55', No. 2, 110', No. 3, 100'. Property includes a mill site, on the San Francisco river. Lands are said to show veins of 5 to 10' width, carrying a considerable variety of copper ores of different grades. Generally idle since organization, except for ostensible efforts to raise money for a 50-ton smelter. Is not regarded favorably.

ARIZONA CONSOLIDATED GOLD & COPPER CO. ARIZONA

Office: Phoenix, Ariz. Mine office: Winkelman, Gila Co., Ariz. H. B. St. Clair, pres.; Eugene Brady O'Neill, vice-pres.; H. H. McNeill, sec.-treas.; preceding officers, C. F. Leonard, E. L. O'Malley and Wm. Hardwick, directors. Organized June 12, 1907, under laws of Arizona, capitalization \$5,000,000, shares \$1 par.

Lands, 13 claims, unpatented, area 260 acres, known as the Hardwick and Copper groups, also a 20-acre mill site, in the Saddle Mountain dis-

tract. Property shows numerous fissure veins, of which 4, under development, are said to average 30" in width. Mine has a 40' tunnel, and pits and shafts of 40', 70' and 100'. No returns secured.

ARIZONA CONSOLIDATED MINES CO.

ARIZONA

Mine office: Wellton, Yuma Co., Ariz. Organized Aug., 1909, capitalization \$3,000,000, shares \$10 par, by Geo. R. Bentel, F. M. Prescott and Thos. F. Bentel. Lands, 56 claims, 14 miles from Wellton, including lands bought of Hecla Consolidated Mining Co., and 2 adjoining properties. Mine is said to have about 4,000' of workings, and is claimed to have about 30,000 tons of ore on the dump, with 70,000 tons developed underground, with estimated average value, for entire 100,000 tons, of \$43.35 per ton, which figures are considered excessive. No trace of operations secured.

ARIZONA COPPER BELT MINING CO.

ARIZONA

Office: 25 Broad St., New York, N. Y. Mine office: Constellation, Yavapai Co., Ariz. Wm. J. Dilthey, pres.; J. C. Maugans, vice-pres. and treas.; Alex. S. McNear, sec.; preceding officers, Albert Ullman and Samuel Bloom, directors; Chas. F. Dilthey, mine foreman. Organized Feb., 1906, under laws of Arizona, capitalization \$1,000,000, shares \$1 par, nonassessable; issued, \$655,673.

Lands, 14 claims, unpatented, area 240 acres, well watered, include the Wren group of 4 claims and Texas group of 10 claims near the Hassayampa river, in the Black Rock district about 17 miles northeast of Wickenburg, the nearest railroad point. The property shows granite and schist, said to carry numerous orebodies. The 8' Texas fissure vein, having shafts of 32', 80' and 200', and tunnels of 78', 90' and 120', shows mainly gold ore, reported by company to have average values of \$21 per ton.

The main camp was removed to the Wren group, July, 1910. Wren vein No. 1, of 5' estimated average width, shows mainly chalcopryrite, and occasional chalcocite, with some oxidized ores, estimated by company to average 5% copper, 2 oz. silver and \$8 gold per ton. Development includes an 80' shaft and tunnels of 40' and 300'. A shipment to the Copper Queen smelter recently averaged \$20.54 per ton in gold, silver and copper. Property as a whole has about 1,100' of workings, and is estimated by management to show 20,000 tons of ore, with 2,000 tons blocked out for stoping.

Equipment includes 5 small mine buildings, and work was started, 1909, on a 10-stamp mill, which remains uncompleted. Management planned installing a 30-ton smelter, but has decided to wait until the ore blocked out warrants a 100-ton smelter. A letter published in a prospectus of the company, and signed R. W. Groo, was stamped as unauthorized by R. W. Groo, Bingham Canyon, Utah, April, 1911, and demand made on the president of the company that alleged letter be withdrawn.

ARIZONA COPPER CO., LTD.

ARIZONA

Office: 29 St. Andrews Square, Edinburgh, Scotland. Mine and works office: Clifton, Greenlee Co., Ariz. John Wilson, chairman; P. Dickson, J. P., G. Readman, W. A. Carter, Y. J. Pentland, Alex. McNab, J. P., F. L. Macleod and Lord Salvesen, directors; Norman Carmichael, gen. mgr.; Wm. Exley Miller, sec.; L. D. Ricketts, cons. engr.; J. G. Cooper, cashier and purch. agt.

Organized Aug. 5, 1884, under laws of great Britain, capitalization £755,000, originally in £40,000 of A preference shares, 5s. par, upon which no calls have been made, but with £7,480 1s., paid in advance; £320,000 authorized and £316,530 issued in full paid preference stock; £320,000 authorized and £316,530 issued, shares 5s. par, of fully paid preferred stock, and £75,000 authorized, £63,444 issued, shares 5s. par, of fully paid

deferred stock. Early 1909, a change was made by which old preferred and deferred ordinary shares were succeeded by one series ordinary shares, of 5s. par, of which 1,519,896 shares have been issued. Profits are divided as follows: 10% cumulative dividends on A preference shares; 7% cumulative dividends on preference stock, and balance to ordinary shares. Had £175,210 of 5% terminable debentures, redeemed, 1912, and superseded by an issue of £500,000 terminable debentures repayable at 105, May 15, 1922, or at any time after May 15, 1915. Fiscal year ends Sept. 30. Dividends on ordinary shares for recent years have been as follows: 5s. 3d. in 1906; 3s. 9d. in 1907; 2s. 6d. in 1908, 1909, 1910 and 1911; 3s. 3d. in 1912. Free profits were £480,775 in 1912. Reserves, Sept. 30, 1912, were £764,119.

Lands, about 200 claims, 4,000 acres, including 8 producing mines, at Morenci, Metcalf, Longfellow, Garfield and Coronado, in Greenlee county, Ariz. Ores, as produced, give average returns of about 2.5% copper, production being about 4% smelting ore and 96% concentrating ore. Mines, except the Coronado, are developed to a depth of about 500' only, being opened mainly by tunnels, giving cheap extraction. Notwithstanding the comparatively shallow zone of development a large amount of ore is in sight.

During the year ending Sept. 30, 1912, the company mined 927,116 dry tons of ore, of which amount 655,396 tons, or 70%, came from the Longfellow mine, and 271,720 tons from the Metcalf mines. The yield of these ores was approximately 41 lbs. fine copper per ton of ore smelted.

The Humboldt mine, which is the principal producer, shows a large body of low-grade disseminated chalcocite. Contiguous to this are the Yavapai, Clay and Petaluma mines, all of which are developed by shafts and connected by tunnels with a main hoisting shaft at No. 6 concentrator at Morenci, where the ore is concentrated. The Longfellow mine of this group delivers its ore through chutes to a tunnel on the level of the Coronado railroad, over which the ore is transported to the concentrators at Clifton. This group of mines is thoroughly equipped with electric haulage, Jeffrey 6-ton locomotives and cars of 5 tons capacity each being used. The main haulage level, 250' below the main adit tunnel, is laid with 50-lb. steel. The workings are electrically lighted throughout. Development is being carried on 200' below this level with satisfactory results.

The Metcalf group is situated 7 miles from Clifton, with which it is connected by the Coronado railroad, a 3' gauge, owned and operated by the company, which follows the course of Chase creek on heavy grade. These mines supply the bulk of the oxide ores and are worked principally by open-cut methods, the ore being leached with sulphuric acid.

The Coronado mine, 2 miles west of Metcalf, and at an elevation of 1,500' above it, is developed by 3 shafts, the main working shaft being 1,100' deep, April, 1913. Ores from this mine now hoisted to surface and transported over surface tramways and a long incline to the Coronado railroad, and thence to the Clifton concentrators will in the near future be handled through a tunnel now being driven from the Chase Creek side of the mountain at the level of the main haulage of the Humboldt group, with which it will be connected by an electric railroad. This deep adit tunnel will connect with the main working shaft of the Coronado mine at the new 1,100' level, the extension of which tunnel under the orebodies will develop them 400' below the present workings.

All the company's producing properties are connected by gravity inclines with the Coronado railroad, the main artery between the mines and reduction works at Clifton. The reduction works consists of a concentrator of 1,500 tons daily capacity, situated at Morenci. This is a fine steel

and concrete plant, the capacity of which is now being increased to 3,000 tons per day. A concentrator of 700 tons capacity for the treatment of sulphide ores is also operated at Clifton, and a concentrator for treating oxide ores, with a capacity of 400 tons per day, is situated at the same place. The tailings from the oxide concentrator are treated in a leaching plant, with sulphuric acid from the company's own acid plant, which supplied 4,000 tons of acid last year made from pyrites mined at Morenci.

The company is building a complete new smelting plant on the left bank of the San Francisco river, 2 miles below Clifton. This plant will be entirely of steel and concrete and will consist of a bedding plant for receiving and mixing the ores, supplementary bins also being provided; a roasting plant consisting of 8 Herreshoff air-cooled roasters; a large dust chamber fitted with No. 10 wires hanging 4" apart; 3 oil-fired reverberatory furnaces, 22' in diameter by 100' long; 7 waste-heat boilers, with a combined capacity of 500-h. p.; 3 converter stands with 4 converter shells of the Great Falls type 12' in diameter. The power plant will consist of two 10,000' capacity Nordberg blowing engines for the converters and 3 units of 2,500 kw. General Electric turbo-generators to supply electricity for the plant and also for the mines, a transmission line being built to convey the current at 13,200 volts. Well-equipped machine shops, plate shops, supply house, etc., are provided.

Miscellaneous enterprises operated by the company include foundry, machine shop, sawmill, a 30-ton ice plant, and a town lighting plant. The company also has general merchandise stores at Clifton, Longfellow, Metcalf and Coronado.

Recent productions for fiscal years ending Sept. 30, has been as follows: 27,404,000 lbs. in 1907; 33,962,000 lbs. in 1908; 31,962,000 lbs. in 1909; 32,210,000 lbs. in 1910; 34,584,000 lbs. in 1911 and 38,132,000 lbs. in 1912. For 8 months in 1913, mines produced 23,000,000 lbs. copper.

ARIZONA COPPER-GOLD MINES CO.

ARIZONA

Office: 1011 Pabst Bldg., Milwaukee, Wis. Mine office: Cherry, Yavapai Co., Ariz. R. H. Burmister, pres. and gen mgr. Organized Oct. 12, 1903, under laws of Arizona, capitalization \$1,000,000, as Arizona Gold Lode Mines Co., and reorganized, April 10, 1906, under present title, capitalization \$1,500,000, shares \$1 par.

Lands were 17 claims, area 340 acres, in the Cherry Creek district, 15 miles northeast of Humboldt, but the Bugler group of 4 claims was sold, 1909, to Smith & Oliver, reducing holdings to 13 claims, area 260 acres. Development includes several short tunnels, and the Leghorn shaft of 600' depth, with about 3,500' of workings, on a 2' fissure vein. The ore apparently averages about 2% copper, with gold values.

Equipment includes a 40-h. p. hoist, good for 1,000' depth, and a 3-drill air compressor. A mill, at the Leghorn shaft, rated at 40 tons daily capacity, has a 10' Lane slow-speed Chilean mill, and made a test run, 1907, but, foundation proving defective, it was repaired, permitting another test run, Aug., 1909, that gave a \$500 gold brick. Company was promoted by Pierce Underwood, a notorious faker, and advertised extensively, with some very untruthful statements, but apparently the present management is trying to make the best of a difficult bargain.

ARIZONA COPPER & GOLD MINING CO.

ARIZONA

Idle. Mine near Salome, Yuma Co., Ariz. Company owns a 20% stock interest in the Savage Gold & Copper Mining Co. Lands, 5 claims, unpatented, in the Harcuvar mountains, having a 55' tunnel showing a 5' vein of auriferous copper ore, and a 320' shaft bottomed in a vein of 20'

width carrying malachite and chalcopyrite. Mine claimed to have about 1,000 tons of smelting ore on the dump.

ARIZONA COPPER MINING CO.

ARIZONA

Idle many years. Office and mine: Tucson, Pima Co., Ariz. E. C. Griffith, pres.; Louis F. Fletcher, vice-pres.; Vincent Brunner, sec.-treas.; preceding officers and P. G. Turner, directors; B. C. Brechta, supt., at last accounts. Lands, 20 claims, in the Tucson mountains, having a 400' tunnel, said to show an 8' vein carrying ore of good grade.

ARIZONA COPPER QUEEN MINING CO.

ARIZONA

Idle. Office: New York Life Bldg., Kansas City, Mo. Mine office: Mayer, Yavapai Co., Ariz. Shannon C. Douglas, pres.; Edwin Herrider, sec.; Ernest J. White, treas.; Wm. Burr Douglass, gen. mgr.; preceding officers and H. C. Crowell, directors, at last accounts. Organized July 24, 1907, under laws of Arizona, capitalization \$5,000,000, shares \$1 par. Lands, 6 claims, on Copper creek, 25 miles southeast of Mayer, claimed to show 10 practically parallel veins, carrying ore assaying 6 to 84% copper, 2 to 57 oz. silver and \$10 to \$100 gold per ton. Development is by various trenches and by shafts, 30', 30', 35', 40', 60' and 90'. Equipment includes a power plant with air compressor. No trace of operations secured.

ARIZONA COPPER SHIPPING MINES CO.

ARIZONA

Office: P. O. Box 592, El Paso, Tex. Mine office: Dragoon, Cochise Co., Ariz. I. M. Moore, pres.; C. L. Cummings, vice-pres.; C. F. Elliott, sec.-treas. Organized 1910, capitalization \$1,000,000, shares \$10 par; issued \$620,000.

Lands, 8 claims, in process of patenting, area 160 acres, are located 2 miles northeast of Dragoon. The property shows a limestone crossed by numerous veins, averaging 2 to 12' width, said to carry 4 to 7% copper, 1 to 6 oz. silver and a trace of gold. Development is by several pits and shallow shafts, deepest 130', with about 600' of workings. Property considered promising.

ARIZONA EMPIRE COPPER MINES CO.

ARIZONA

Office: Bradbury Bldg., Los Angeles, Cal. Mine office: Parker, Yuma Co., Ariz. W. A. Moses, pres.; Gen. E. Bouton, vice-pres.; L. H. Knowlte, sec.; Newton Evans, treas.; preceding officers and F. X. Pfaffinger, directors; C. W. Mitchell, gen. mgr.; Jas. H. Watson, supt. Organized Aug. 1909, capitalization \$5,000,000, shares \$5 par.

Lands, bought of Carnation Mining Co., are 41 contiguous claims, area 820 acres, about 10 miles north of Parker and 3 miles from Eagle Landing on the Colorado river, including the Eagle, Carnation, Belcher and Cyclone groups. Company also has 160 acres of ranch lands on the Colorado river, including Eagle landing, held for a smelter site. Geological conditions are markedly similar to those at the Planet and Clara mines. The property, as a whole, has about 6,000' of workings, deepest 300', showing a large amount of copper carbonates, with sulphide zone not yet reached. The Eagle group has incline shafts of 70 and 300', and 1,500' of tunnels, showing considerable ore of smelting grade, with several hundred tons of ore on the dumps assaying 15 to 25% copper, and \$5 to \$20 gold per ton. The Walters crosscut tunnel, with back of 300', has some 5% copper, ore said to hold \$5 gold per ton. On the 200' level of the Carnation shaft is an ore-body said to assay 5% copper and \$5 gold per ton, carrying a 10' paystreak estimated to average 10% copper and \$6 gold per ton. Company, 1911, by location, acquired 720 claims, 10 miles up the Colorado river from Parker, but apparently is doing only assessment work on these claims, mining operations being confined to the Carnation and Eagle groups, at last accounts.

Surface showing is interesting, but development work is disappointing.

Shallow excavations show irregular areas, often 50' wide, well stained with copper carbonate; much of it could be shipped. This green carbonate ore has been carefully piled and makes beautiful patches of color on the desert scenery. Development usually reveals a sheared zone, copper-stained, but only a few feet wide. Throughout this region there are occasionally encountered pockets of rich gold ore with the copper. These seem to be lenses interbedded in the schist and while one or two important orebodies have been found in the region, no mines of importance have been developed.

ARIZONA EXPLORATION CO.

ARIZONA

Mine near Mayer, Yavapai Co., Ariz. Chas. Carman, supt.; Martin Heller, cons. engr., at last accounts. Is controlled, through stock ownership, by Consolidated Arizona Smelting Co. Property is the Blue Bell mine, connected with the Prescott & Eastern railway by aerial tram. Lands, 3 claims, having 3 fissure veins in Algonkian slates with quartzite footwall and granodiorite hanging, developed by 6 shafts, deepest 600', and by tunnels of 70' and 75', showing cuprite, malachite, chalcopryrite and chalcocite, all slightly argentiferous and auriferous, with large orebody opened on the 300' level. Nos. 1 and 2 shafts, 1,800' apart, are connected on the 500' level. The orebody is claimed to be 15 to 32' wide and to average 5.5% copper and \$3.50 in combined gold and silver values per ton, which figures are considered excessive, though the property is considered valuable. Equipment includes an electric power plant, taking current from a 10-mile transmission line. No recent returns secured.

ARIZONA GIANT COPPER CO.

ARIZONA

Probably idle. Office: 229 Byrne Bldg., Los Angeles, Cal. Mine near Ehrenberg, Yuma Co., Ariz. R. M. Furlong, pres.; H. Franklin Hiller, sec.-treas. Capitalization \$3,000,000, shares \$1 par. Lands, 320 acres.

ARIZONA GOLD & COPPER CO.

ARIZONA

Mine office: Winkelman, Gila Co., Ariz. Organized Jan., 1908, under laws of Arizona, capitalization \$500,000, by Chas. Bauer and C. A. Bauer. Lands are 6 miles northeast of Winkelman, near the Saddle Mountain mine. Idle since organization and apparently moribund.

ARIZONA GOLD & COPPER MINING CO.

ARIZONA

Office: 156 College St., Burlington, Vt. Mine office: Gleeson, Cochise Co., Ariz. Judge W. P. Smith, vice-pres.; W. R. Cheney, treas.; Hamilton S. Peck, clerk; preceding officers, T. V. Blaisdell, J. H. McLoud and J. S. Patrick, directors. Organized July 28, 1911, under laws of Vermont, capitalization \$100,000, shares \$5 par, as successor of the Vermont & Arizona Copper Co.

Lands, 11 claims, area 220 acres, 4 miles from Gleeson, in the Turquoise district, on the western slope of the Dragoon mountains, showing 2 gold and silver veins and several copper veins, latter giving assays of 23 to 43% from selected carbonate ores. Development is by a 230' main shaft, with 3,000' of workings. Company claims to have developed a large body of low-grade milling ore. Equipment includes steam power.

ARIZONA GOLD MINES CO.

ARIZONA

Mine office: Wickenburg, Maricopa Co., Ariz. Lands, on Buckhorn gulch, in the Castle Creek district, southeast of Wickenburg, are developed by trenches and a shallow 2-compartment shaft, planned to be sunk to depth of 600'. Was developing, with a small force, 1911.

ARIZONA-HANCOCK COPPER CO.

ARIZONA

Idle several years. Office: Hancock, Mich. Mine office: Florence, Pinal Co., Ariz. John D. Cuddihy, pres.; Alfred C. Sieboth, vice-pres.; Henry L. Baer, sec.-treas.; preceding officers, C. D. Hanchette, F. C. Mayworm and Philip Carroll, directors. Organized under laws of Arizona, as

successor to Arizona-Hancock Consolidated Mining Co. Lands, 4 claims, patented, 2 miles south of Superior, showing a vein traversing 2 claims, parallel to the vein of the Lake Superior & Arizona, with diabase footwall and limestone hanging, opened by a short tunnel and a winze of 55', with drifts on 2 levels, showing lead above and copper below.

ARIZONA HERCULES COPPER CO.**ARIZONA**

Office: 111 Broadway, New York, and 702 Union Oil Bldg., Los Angeles, Cal. Mine office: Ray, Pinal Co., Ariz. W. P. Dunham, pres. and gen. mgr.; E. G. Thomas, sec.-treas. and supt. Organized Sept. 15, 1906, capitalization \$10,000,000, shares \$10 par, nonassessable; issued \$7,127,790. Annual meeting, first Tuesday in September.

Lands, 20 claims, 10 patented. Area, 307.24 acres, of which 207.24 acres are mineral and located on the eastern side of Mineral creek in the center of the Ray district and surrounded by the claims of the Ray Consolidated Copper Co. Land shows schist, granite, porphyry and diabase.

Development in earlier years was done by 7 shallow shafts, varying in depth from 25 to 210', with a total of 750' of workings, exposing oxidized ores, mainly chrysocolla, varying from 2½ to 20% copper. Principal development 1910-13, has been done by churn drilling, the company having used two No. 24 Star drilling machines, with which 27 holes were drilled, varying in depth from 330 to 1,225'; in all 16,148' of drilling was done upon the property. The drill holes proved that the property carries disseminated ores similar to those mined by the Ray Consolidated Copper Co., and that when the ore zone was reached all of the formations, namely schist, diabase and granite porphyry, were equally enriched with disseminated chalcocite. A large tonnage was proven and blocked out by the various drill holes, computed as several million tons by various prominent engineers who have examined the property. The average grade is estimated at 2.48% copper. The same methods of sampling and supervision were used in the drilling as were in use by the Ray Consolidated Copper Co.

The drilling has shown the ore to extend for 1,200' east and west, with a length of over 2,500' north and south. The indications are said to be favorable for its continuance to the eastern limits of the property. A number of drill holes have exposed 2 distinct orebodies; hole No. 13, at the north end of the property, having cut a second orebody at a depth of over 800', and hole No. 27, at the south end, having encountered the second orebody, and still in it when stopped at a depth of 710'. Further development of this orebody should increase very materially the estimated tonnage.

Company plans development in 1913-14, with a view of opening the orebodies outlined by the drill holes, for extraction and equipping the property with the necessary plant and equipment for treating the ores.

ARIZONA-IDAHO COPPER EXTRACTION CO. PENNSYLVANIA

Office: 711 Union Bank Bldg., Pittsburgh, Penn. Wm. E. Greenwalt, pres.; Ernest H. Browne, sec.-treas. Organized about 1908, capitalization \$500,000, shares \$1 par, nonassessable.

Owns no mines; property is a copper extraction process which the company claimed would produce copper at from 4 to 6 cts. per pound. Company was offering 50,000 shares at 50 cts. per share, to raise cash required to enlarge the demonstrating plant at Denver, at last accounts.

ARIZONA LEAD-SILVER-COPPER CO.**ARIZONA**

Mine and office near San Carlos, Gila Co., Ariz. Property, 15 claims near Copper Reef mines, is developed by tunnel and said to show argentiferous and auriferous copper ore. Was developing, with small force, 1912.

ARIZONA LE ROI COPPER MINING CO.**ARIZONA**

Idle. Office and mine: Kingman, Mohave Co., Ariz. J. N. Turrentine, pres.; W. H. Bradley, vice-pres.; Maj. W. A. Mensch, sec.-treas. and gen. mgr.; preceding officers, W. S. Shafer, Geo. H. Craig, Francis M. Townsend and J. H. Sampson, directors. Organized Nov. 17, 1906, under laws of Arizona, capitalization \$1,000,000, shares \$1 par; issued, \$552,000. Annual meeting, second Tuesday in January.

Lands, 7 claims, unpatented, area 140 acres, in the Maynard district, adjoining the Enterprise Mining, Reduction & Improvement Co., 18 miles from Kingman. Lands show granite exposures, with porphyry dikes, carrying 4 veins, of which one, under development, with strike N. 20° W., is estimated by management at 18 to 60' width, and is claimed to be traceable 3 to 4 miles, showing oxidized ores above and sulphides below, estimated to average 2.5% copper, 37% lead, 35 oz. silver and \$3 to \$12 gold per ton, which figures are considered excessive.

ARIZONA MERCANTILE TRANSP. & SMELTING CO.**ARIZONA**

Idle. Office: Leavenworth, Kans. Mine office: Casa Grande, Pinal Co., Ariz. Capitalization 1,000,000 shares, presumably \$1 par. Lands, 5 claims and a mill site, near Casa Grande. Is said to have a 20-stamp mill and a 50-ton smelter. Presumably out of funds and merely keeping up taxes.

ARIZONA MERGER GOLD & COPPER CO.**ARIZONA**

Idle. Henry Rupsynder, mgr., Ferguson Bldg., Los Angeles, Cal. Mine near Mayer, Yavapai Co., Ariz. H. C. Hillwell, S. L. Herron, Henry Reefson, Alonzo Hall, Robert M. Bazel and Geo. D. Birch directors, at last accounts. Organized 1909, under laws of Arizona, as a reorganization of the Lyon Copper Co., capitalization \$5,000,000, shares \$1 par. Property, 50 claims near Mayer, Yavapai Co., Ariz., show fissure veins developed by a number of tunnels and crosscuts with 250' shaft. Property considered promising and worthy of development.

ARIZONA & MICHIGAN DEVELOPMENT CO.**ARIZONA**

Office: Benson, Ariz. Mine office: Johnson, Cochise Co., Ariz. A. J. Pidgeon, of San Diego, Cal., pres. and gen. mgr.; P. N. Lindley, sec.; E. J. Matlock, supt. Organized 1904, under laws of Arizona, capitalization \$2,500,000, shares \$5 par. Lands, 7 claims, patented, area 140 acres, showing porphyry and limestone carrying 4 orebodies, 1 opened by vertical and incline shafts and by tunnels, showing a 5' vein with poorly defined walls and impregnations in the limestone hanging and porphyry footwall. Has a 150' two-compartment main shaft with 24 openings showing cuprite, malachite and copper sulphides said to give average assays up to 12% copper, 18 oz. silver and \$1 gold per ton. Has a 60-h. p. gasoline engine with double-drum hoist, and has shipped a little good ore to El Paso smelter. Company owns a short railroad connecting with the Southern Pacific railway at Dragoon. Was developing, with small force, early 1913.

ARIZONA MINE.**WYOMING**

Office and mine: care Horace E. Adams, owner, Hecla, Laramie Co., Wyo. Lands, 4 claims, area 80 acres, in the Silver Crown district, opened by a 160' shaft and tunnels of 100', 100' and 120' showing native copper, oxides, carbonates, chalcocite and chalcopyrite. Has gasoline power and a small leaching plant. Idle several years, except for annual assessment work, owing to lack of funds.

ARIZONA MINES CO.**ARIZONA**

Office: 60 Congress St., Boston, Mass. Mine office: Wickenburg, Maricopa Co., Ariz. David E. Dow, pres.; Geo. W. Smith, vice-pres.; Bruce Hobbs, sec.-treas.; Mark Bradley, gen. mgr.; preceding officers and

Edgar S. Hill, directors; J. W. Nicholson, supt. Organized Jan. 7, 1910, under laws of Arizona, capitalization \$2,000,000, shares \$10 par, nonassessable. Federal Trust Co., Boston, registrar; State Street Trust Co., Boston, transfer agent. Stock is listed on the Boston curb.

Lands, 7 claims, area 150 acres, in the Castle Creek district of the Bradshaw mountains, about 13 miles from Wickenburg. Property, known as the Tomboy group, shows an orebody up to 50' in width, traced by trenching for nearly 1 mile. Development includes several short tunnels, and a 250' shaft, showing a 40' vein carrying about 3' of disseminated malachite, said to assay 14% copper and \$18 gold per ton, ore being exclusively oxidized to depth opened. Mine as a whole has about a quarter-mile of workings. Company estimates average values at about 14% copper, 8 to 10 oz. silver and \$8 gold per ton. Equipment includes an 18-h. p. hoist, good for 600' depth, and necessary mine buildings. Management plans deepening shaft and continuing development. A full report on the property was made Oct., 1910, by Mark Bradley, mg. engr.

ARIZONA MINING CO.

ARIZONA

Mine in Yuma Co., Ariz. Organized in Lead, Lawrence Co., S. D. Property said to show a $2\frac{1}{2}'$ vein carrying gold, silver and copper ore averaging 20% copper with \$70 in gold and silver. A gasoline hoist being erected, 1913.

ARIZONA MINING & REALTY CO.

MEXICO

Office: 404 Burlington Bldg., St. Louis, Mo. Mine office: Nacozari, Moctezuma, Sonora, Mex. W. L. Musick, pres.; J. F. McCourtney, vice-pres.; W. N. McCourtney, sec. No trace of operations secured.

ARIZONA MINING & TRADING CO.

MEXICO

Idle. Office: Douglas, Ariz. Mine near Nacozari, Sonora, Mex. E. O. Wolf, gen. mgr.; H. C. Holbrook, mine supt. Organized 1906. Lands are in 2 groups, 8 miles and 16 miles southeast of Nacozari, former known as Los Angeles mine, having a 75' shaft showing chalcopryite of good grade. A carload of ore shipped to the Copper Queen smelter gave returns of 12.5% copper and 46 oz. silver per ton. Has a concentrator.

ARIZONA MORENCI COPPER CO.

ARIZONA

This company deeded its properties back to the original owners in Sept., 1912, and is now out of business. The original owners have organized the Arizona Celtic Copper Co., described under that title.

ARIZONA NATIONAL COPPER CO.

ARIZONA

Office: 327 Pine St., Williamsport, Pa. Mine office: Globe, Gila Co., Ariz. Thos. M. B. Hicks, pres. and treas.; C. S. Messerly, sec.; LeRoy Scholl, gen. supt. Organized Feb. 1, 1906, under laws of Arizona, capitalization \$3,000,000, shares \$10 par. Bonds \$300,000, at 5%.

Lands, 14 claims, also a 15-acre mill site and 100 acres timber lands, formerly known as the McNelly-Crowley property, on Pinto creek, carrying contact veins between schist and granite, said to average 14' in width and traced 785', showing considerable high-grade oxidized ores, including chrysocolla and native copper, with some chalcopryite and occasional bornite. The 80' ledge of decomposed schist is slightly impregnated with copper sulphides. Development was by shafts of 50' and 85', and by tunnels of 195, 250 and 300', with a total of 2,000' of workings. Has steam power.

ARIZONA-NEVADA COPPER CO.

ARIZONA

Office: Hibernian Bldg., Los Angeles, Cal. Mine office: Hillside, Yavapai Co., Ariz. Jas. A. Snedaker, pres.; E. M. Bray, vice-pres.; E. B. Bronson, sec.; Benjamin E. Page, treas.; preceding officers, W. T. Hook, L. M. Hart, Jos. L. Giroux, Eugene L. Giroux and Ralph C. Lupton, direc-

tors; Henry A. Geisendorfer, supt. Organized April 9, 1909, under laws of Delaware, capitalization \$5,000,000, shares \$5 par; \$2,650,000 issued.

Company, primarily a holding company, controls the Bagdad Copper Co. and the Atlanta Gold Mining Co., and also owns a number of copper properties at Luning, Nev., and Darwin, in the Coso mining district, Inyo Co., Cal.

ARIZONA-PACIFIC COPPER CO.

ARIZONA

Idle. Office: 705 State Life Bldg., Indianapolis, Ind. Mine office: Florence, Pinal Co., Ariz. F. P. Jeffries, pres.; John W. Sharpe, vice-pres. and gen. mgr.; Henry Severin, treas.; Murat W. Hopkins, sec.; Manuel Villar, supt., at last accounts. Organized March 30, 1903, under laws of Arizona, capitalization \$5,000,000, shares \$1 par.

Lands, 16 claims, area 320 acres, also an 80-acre smelter site at Wooley, south of the Gila river, and about 7 miles south of Kelvin, connected by 4-mile wagon road with the Phoenix & Eastern railway. Property shows sundry minor veins, assaying 3 to 20% copper and \$5 to \$20 gold per ton. A much shattered quartz-porphry dike, 1,200' long and about 500' in extreme width, running east and west, is cemented by veins carrying cuprite, melaconite and chalcocite, having average values of 1½% copper, 1 oz. silver and some gold per ton. Has shafts of 80' and 350', also tunnels of 260' and 342'. Has 2 gasoline hoists, air compressor, power drills, and necessary mine buildings. Property is regarded as promising, owing to size of the orebody, though the ore is low in tenor, but apparently well adapted to close and economical concentration.

ARIZONA-PACIFIC COPPER CO.

ARIZONA

Mine office: Patagonia, Santa Cruz Co., Ariz. Col. O. I. Posey, pres.; Allan G. Fraser, sec. Is an English company, organized in 1912.

Lands, 8 claims, 12 miles north of Patagonia, in the Wrightson district on the Santa Rita mountains, known as the August group, are slightly developed. Claims are said to have been bought for \$50,000 cash, in installments.

ARIZONA-PITTSBURGH MINING & SMELTING CO.

ARIZONA

Letter returned unclaimed from former office, Pittsburgh, Pa. Mine office: Patagonia, Santa Cruz Co., Ariz. H. W. Graib, pres.; John H. Wilson, vice-pres.; R. A. McDonald, sec.-treas.; preceding officers and Julius Bieler, directors; C. R. Reno, mgr.; Frank Siebold, supt. Organized June 7, 1907, under laws of Arizona, capitalization \$2,000,000, shares \$1 par.

Lands, 32 claims. 1 owned and 31 held under bond and lease, area 640 acres, 3 miles east of Patagonia. Development includes a 200' shaft, showing a vein of 8' estimated average width, said to be traceable 6,000', estimated by company to carry ore averaging 5 to 7% copper, about 20% lead and 12 oz. silver per ton. Ores are argentiferous chalcopyrite and galena, with quartz gangue, lead decreasing and copper increasing with depth. The mine is located on the Veta Grande, the principal of the 2 important veins on the Patagonia side of the Santa Rita mountains. Equipment includes a 40-h. p. hoist, good for 1,000' depth, and a 3-drill Sullivan air compressor. Resumed operations, Jan., 1912, after several years idleness, and was developing, with small force, at last accounts.

ARIZONA PROSPECTING & DEVELOPMENT CO.

ARIZONA

Mine office: Wickenburg, Maricopa Co., Ariz. H. S. LeCompte, pres. and gen. mgr. Organized Jan., 1909. Lands include the Angel, Antler and Speculator, or Maricopa groups, latter said to show good gold ore. The Angel group, 6 claims, about 2 miles from the Vulture mine, has a 200' shaft. Properties carry argentiferous and auriferous copper and lead ores. Equipment includes gasoline power and an air compressor.

ARIZONA RIO TINTO MINING CO.**ARIZONA**

Office and mine: San Simon, Cochise Co., Ariz. John A. Duncan, pres., treas. and gen. mgr.; John H. McClellan, vice-pres.; L. Grant Duncan, sec.; preceding officers and Geo. E. Sligh, directors. Organized March, 1911, under laws of Arizona, capitalization \$5,000,000, shares \$5.

Lands, 72 claims, known as the Duncan group, south of Paradise, and the Taylor-Cardwell group in Wood canyon, about 18 miles west of Paradise, with adjoining claims, all slightly developed.

The property shows limestone broken and faulted by intrusive dikes of trachite and quartz-porphry showing iron blossoms carrying a small amount of copper carbonates and sulphides. Ores are copper and lead, argentiferous and slightly auriferous, giving assays of \$1.80 to \$12 gold per ton. Development is by tunnels, longest 100', on the Enterprise claim, disclosing ore estimated to average 6% copper. Mine has about one-half mile of workings.

ARIZONA SMELTING CO.**ARIZONA**

Office: 15 Broad St., New York. Works office: Humboldt, Yavapai Co., Ariz. Organized Feb., 1905, under laws of New Jersey, capitalization \$150,000, presumably increased later. Is controlled, through ownership of entire stock issue, by Consolidated Arizona Smelting Co. Bonds, \$180,000, at 5%. Annual meeting, first Monday in December. Property is described under title of Consolidated Arizona Smelting Co.

ARIZONA-SOUTHWESTERN COPPER CO.**ARIZONA**

Office: 18 Board of Trade Bldg., Pueblo, Colo. Mine office: Yucca, Mohave Co., Ariz. Fred Hessel, pres.; L. Hoffmann, vice-pres. and gen. mgr.; J. H. Hoffman, sec.-treas.; preceding officers, C. Hoffmann, R. H. Weber, W. G. Laidley and J. E. Mischler, directors; C. J. Price, engr; John Lefler, mine supt., and H. M. Postel, mill supt. Organized 1907, under laws of Arizona, capitalization \$3,000,000, shares \$1 par, nonassessable; issued 2,970,000. Annual meeting, held in Kingman, Ariz., in Aug., 1913.

Lands, 9 claims, patented, area 176 acres, including the Pittsburgh mine, in Crow canyon, Cedar Valley district, Hualapai mountains, 25 miles from Yucca, the nearest rail point. Property has 2 orebodies under development, estimated by company to average 30' in width and to be traceable 2 miles, opened by tunnels of 500' and 682', and shafts 225' and 300' connecting with the main tunnel, with about 4,500' of workings. Mine, which is quite wet, shows chalcopyrite, galena and sphalerite, estimated by company to average 5% copper, 8% lead, 4% zinc, 15 oz. silver and \$5 gold per ton, which seems too high for a large orebody of this type. Company claims 400,000 tons blocked out for stoping and 700,000 tons in sight, which estimate is high. Given a depth of 300', a width of 30', as stated and proven in a lateral direction for 500', which is some ore shoot, would place only about 300,000 tons in sight.

Equipment includes an 85-h. p. electric hoist, steel headframe, a 12-drill Ingersoll-Rand air compressor, smithy and concentrator 120x50', of 150 tons daily capacity, with 14 Overstrom tables.

Company is blocking out ore for stoping and expects to begin production in 1913. Mill was started in August, but foundations had to be strengthened before operating steadily.

ARIZONA SUCCESS MINING CO.**ARIZONA & NEVADA**

Idle and probably dead. Mine office: Vicksburg, Yuma Co., Ariz. B. T. Hickman, pres.; Austin E. Park, vice-pres.; Adolph Moltzen, sec. Organized under laws of Arizona, capitalization \$1,000,000, shares \$1 par. Lands, 8 claims southeast of Quartzite, formerly held by Apache Chief Mining Co., having nearly 800' of workings, and a group of 6 claims in the Plomosa district, Arizona, latter said to show 5 contact veins, 2 of which, of 21'

average width, are said to carry oxidized ores giving average assays of 15% copper, 40 oz. silver and \$1 gold per ton, which figures are high. Property has shafts of 50,' 75,' 110,' and 250', and is said to have 1,700' of workings. The equipment includes a 16-h. p. hoist and several mine buildings, and company is said to plan a concentrator. A 15-ton ore shipment to the Humboldt smelter is claimed to have netted \$1,087. Company claimed to guarantee a dividend of 1½ cts. per share on all stock placed at 5 cts. per share, which places the company under suspicion.

ARIZONA TURQUOISE MINES CO.

ARIZONA

The Turquoise mine, formerly owned by this company, was sold in 1911 to F. L. McCracken, of 536 W. 145th St., New York. Company is supposedly out of business.

ARIZONA UNITED MINING CO.

ARIZONA

Office: Pennsylvania Bldg., Philadelphia, Pa. Mine office: Johnson, Cochise Co., Ariz. Alfred S. Miller, pres.; Alfred C. Harmer, vice-pres. and sec.; David H. Ross, treas.; preceding officers, Stanley L. Conklin, John K. Kane, Wm. M. Houston, Alfred H. Miller, J. Wesley Allison, Chas. B. Cox, John Gleeson and Robt. Mackay, directors; J. M. Libbey, mgr.; F. H. Minard, cons. engr. Organized Aug. 12, 1910, under laws of Arizona, as successor to Arizona United Mining Co. of Delaware, capitalization \$5,000,000, shares \$1 par, nonassessable. Company is a close corporation.

Lands, 45 claims, 30 patented, area about 1,000 acres, are located 7 miles northeast of Dragoon, in the Johnson mining camp. Property includes the Mammoth, Republic, Copper King and Southern group of claims. Principal development is on the Republic claim, opened by an 820' shaft, with about 6,000' of workings, in ore averaging about 5% copper.

The Mammoth mine has a 350' shaft, with about 3,000' of workings, in argentiferous and auriferous copper ore, giving average values of about 8% copper, selected ores shipped to the smelter running as high as 40% copper.

Equipment includes a power plant, with good hoists at the Republic and Mammoth mines, and an electric plant and 4 Ingersoll-Temple electric drills and Ingersoll air compressor. Transportation is by a standard-gauge railway from Johnson to Dragoon, connecting with the Southern Pacific railway.

The 125-ton smelter, erected Oct., 1909, and run for a short time only, when in operation produced matte of about 55% copper tenor. Is idle, but is to be enlarged. Production was 245,040 lbs. fine copper and 3,122 oz. silver in 1907; 237,600 lbs. copper, 2,400 oz. silver and 15 oz. gold in 1909.

ARIZONA VENTURE CORPORATION.

ARIZONA

H. R. Collins, mgr., Kingman, Mohave Co., Ariz. Property, the Great Republic mine, near Kingman, formerly a silver producer and on which recent development work has shown copper ore. Mine is near the old Diamond Joe mine and is being reopened and will be energetically developed. Company plans erecting a mill.

Company also reported to own the Waldron group at Deluge, Wash., and to be erecting a mill on that property. According to the mining press, this company has been sending out a report by their expert who describes the mine as opened by a tunnel 150' long with a maximum depth of 120' showing 5' of \$38.48 ore. The expert says, "Cut this to one-half and there is a handsome average value left to pay handsome profits," and remarks that "by extending the tunnel about 80' further there should be encountered . . . a tremendous body, or chamber, of ore, of unusual thickness, fully 20' wide." As our contemporary remarks, an expert who is able to see into the ground to this extent possesses a valuable gift, even if he

assists himself with a Spanish needle, a goldometer or just a plain dowsing rod.

ARIZONA-VERMONT COPPER CO.

ARIZONA

Office: 404 Fleming Bldg., Phoenix, Ariz. Mine office: Morristown, Maricopa Co., Ariz. D. Ainsworth, mgr., at last accounts. Property, about 8 miles from Hot Springs Junction, and 50 miles northeast of Phoenix, is developed by a 100' shaft, said to show a good body of silver-lead ore and auriferous and argentiferous copper ore. Was making small shipments Feb., 1913.

ARIZOTA MINING CO.

ARIZONA

Mine office: Wenden, Yuma Co., Ariz. Seth Bullock, pres., Deadwood, S. D. Organized May, 1912. Lands, 59 claims, area 1,180 acres, are in the Harcuvar mountains, 11 miles north of Wenden. Property is developed by a 125' shaft, showing auriferous copper ore.

ARIZPE MINES CO.

MEXICO

A. Fritsche, pres. and mgr., La Mesa, Cananea, Sonora, Mex. Organized April, 1910, capitalization \$6,000,000, shares \$5 par, assessable; \$2 paid in, as a reconstruction of Arizpe Mining Co. Is controlled by ownership of almost all its shares by the Mexican Metals Co. Property was 6,700 acres, described Vol. VIII under title of Arizpe Mining Co. Formerly at Cananea, Arizpe, Sonora, Mex.

ARK GROUP MINING & MILLING CO., LTD.

WASHINGTON

Office and mine address: 616½ Market St., Hillyard, Spokane Co., Wash. J. J. Budd, pres. and gen. mgr.; D. E. Grobe, vice-pres.; O. L. Budd, sec.-treas.; preceding officers, H. Karlsten and Mary Kneeland, directors. Capitalization \$250,000, shares 25 cts. par, 20 cts. paid, 5 cts. assessable; issued 437,595; assessments to date \$3,000. Annual meeting Oct. 1.

Property, 12 claims, partly patented, in the Kootenai district, British Columbia, and Kettle Falls district, Stevens Co., Wash. Ore occurs in contact between granite and lime with S. W. strike and dip of 45°. Vein reported to be from 2 to 60' wide, traceable for three-fourths of a mile and proven to depth of 150' and carries 10 to 20% copper with good silver values.

Developed by 3 shafts, 18, 50 and 150' deep, and 3 tunnels, longest being 500'. Equipped with steam power, 1 air compressor and 2 air drills.

ARKANSAS & ARIZONA COPPER CO.

ARIZONA

Office and mine: Jerome, Yavapai Co., Ariz. Wm. R. Tucker, pres.; C. W. Clark, vice-pres.; J. E. Leeper, sec. and mgr., Jerome, Ariz.; Hon. W. M. Kavanaugh, treas., Little Rock, Ark.; preceding officers, Judge J. B. Jones, P. H. Reubel and Hon. J. T. Robertson, directors; James Rice, supt. Organized June 25, 1906, under laws of Arizona, capitalization \$1,500,000; increased Jan., 1912, to \$3,000,000, shares \$1 par.

Property, known as the Royal Irish group, consists of 14 claims, 280 acres in the Verde district. Claims show felsite porphyry and diorite cut by olivine basalt dikes running north and south and dipping 60° to the east. Orebodies lie on each side of the basalt in the porphyry and quartz schist. Orebody said to be 85' wide where encountered on 1,400' level and shows chalcoppyrite and some bornite. Extent of shoot not yet determined.

Development by 1,400' shaft with 5,750' total workings of mine. Management plans development of orebody on 1,400 level and sinking shaft to 2,000' depth. Equipment includes three 150-h. p. boilers, 1 hoist good for 2,000', air compressors, machine shop, power house, etc. Company is preparing to build a mile of road to connect with United Verde Copper Co. railroad.

ARKANSAS COPPER CO.**MONTANA**

Mine, on Ten Mile creek, near Helena, Mont., and about 2 miles west of the summit of Mount Helena, is developed by a 200' shaft. Property shows a 30' vein in diorite, traceable 800', assaying well in copper, with small gold and silver values. Was in hands of leasers early 1913, who were shipping high-grade ore.

ARKANSAS MINE.**IDAHO**

Owned by the Seven Devils Copper Co.

ARLINGTON MINING CO.**MONTANA**

Idle. Office: Wallace, Idaho. Mine near Thompson, Sanders Co., Mont. Cyrus W. Gossert, pres.; Chas. T. Fisher, sec. Capitalization \$1,500,000, shares \$1 par.

Land, 20 claims, well timbered, in the Mountain House (unorganized) mining district, near the Idaho-Montana divide. Property shows a ledge, said to be traced 6,000' by surface cuts, 30 to 100' in claimed width, carrying, at shallow depth, galena of concentrating grade, with some ore assaying up to 78% lead. The 175' upper tunnel is said to show 3' of good concentrating galena, and the 900' lower crosscut tunnel shows a 10" stringer assaying 8% copper, 15% lead and 15 oz. silver per ton.

ARMENDAIZ-SUCESORES; FRANCISCO.**MEXICO**

Office: Apartado 37, Monterey, N. L., Mex. Mine office: Cerralvo, Nuevo Leon, Mex. Francisco Armendaiz, mgr. Property includes the Refugio, Barredon and Purisima mines, carrying slightly argentiferous lead ores, which are properties of merit, and the Colorado mine, carrying up to 3% in copper tenor. Mines, which have been small but fairly steady producers of argentiferous lead ores, with a little copper, are under lease to other interests.

ARMINIUS CHEMICAL CO.**VIRGINIA**

Office: 56 Wall St., New York. Jos. B. Clearihue, mgr., Mineral, Louisa Co., Va. Property shows a large lens of pyrite in ancient schistose rocks, which though worked for sulphur ore carries copper recovered from the roasted ore (cinder) by leaching. Mine worked by shaft, equipped with steam hoist, Ingersoll compressor and part of output is concentrated in a 350-ton mill.

ARNOLD MINE.**MONTANA**

Office: care of Dr. G. E. Blackburn, Butte, Mont. Property, the Arnold and Snow Bird claims near Elliston, Powell Co., Mont. Claims show 3 contact deposits between porphyry and dolomitic limestone, opened by a 70' shaft and tunnels of 150' and 200', showing copper carbonates to a depth of about 50'. Succeeded by chalcopyrite. Idle many years.

ARNOLD MINING CO.**MEXICO**

Office: Nogales, Ariz. Mine office: Santa Cruz, Sonora, Mex. E. D. Arnold, pres.; A. O. Koppes, mgr. Property is the Del Pilar mine, about 35 miles northwest of Cananea, developed by a 400' shaft, showing ore said to average 10% copper, a shipment of 200 tons Dec., 1912, returning 13.1% copper. Company planned to erect a 50-ton concentrator early 1913. Employs about 25 men. Property was reported sold to the Manhattan Development Co., for \$88,000, May, 1913.

ARNOLD MINING CO.**MICHIGAN**

Idle. Office: 62 Devonshire St., Boston, Mass. Mine office: Copper Falls, Keweenaw Co., Mich. John C. Watson, pres.; John Brooks, sec-treas.; Capt. Wesley Clark, supt.; preceding officers, Chas. H. Weston and W. H. Currier, directors. Annual meeting, second Tuesday in May. Organized 1864, under laws of Michigan, capitalization \$2,500,000, shares \$25 par; issued, \$1,550,000.

Lands, 3,323 acres, in T. 58 N., R. 31 W., in 2 tracts, including the Old Copper Falls mine and the Arnold mine proper, with frontage of about 3 miles on Lake Superior. The Copper Falls mine, worked 1850, until Aug., 1893, made 25,686,429 lbs. fine copper, mainly from the Owl Creek fissure, and paid dividends of \$100,000. The Arnold mine proper, developed on the Arnold ashbed, was opened 1863, reopened 1897, closed 1901, rock stamped averaging under 0.8% copper. Has a stamp mill and 2½-mile narrow-gauge railroad, known as Arnold & Eagle Harbor, rolling stock of which has been sold. No. 1 shaft of the Arnold is about 1,000' deep, sunk at an angle of 26° with the horizon. In Sept., 1908, employing 5 to 8 men, shipped, from the Owl Creek fissure, 32 tons of copper, including barrel work and 7 or 8 heavy masses, one weighing about 5 tons, averaging a production of about 1 ton of copper per man per month and producing enough metal to pay all expenses, including taxes. Total production, 1899 to 1911, inclusive, was 2,065,817 lbs. fine copper.

ARPS GROUP.**CALIFORNIA**

Idle. Property is a group of 15 claims, unpatented, in T. 34 N., R. 4. W., Shasta Co., Cal., developed by 5 tunnels, of about 1,600' aggregate length, showing sulphide ore.

ASCOT MINING CO.**QUEBEC**

Office and mine: Capelton, Sherbrooke Co., Que. Property, in Ascot township, Sherbrooke Co., shows an ore formation similar to that in the Eustis mine nearby, but not quite so high in sulphur and iron, carrying 2 to 6% copper, with small gold and silver values. Mine, first opened in 1859, is developed by shafts. Equipment includes a Rand 7-drill compressor, steam hoist and necessary mine buildings. Was controlled by a Montreal syndicate, at last reports.

ASHBED MINING CO.**MICHIGAN**

Office: 62 Devonshire St., Boston, Mass. Mine office: Copper Falls, Keweenaw Co., Mich. Francis L. Maguire, pres.; John Brooks, sec.-treas.; Capt. Wesley Clark, supt.; preceding officers, John C. Watson and Charles G. Lund, directors. Organized 1880, under laws of Michigan, capitalization \$1,000,000, shares \$25 par. Annual meeting, second Tuesday in March. Land, 1,143 acres, Peterick mine, in vicinity of Copper Falls, adjoining the Arnold mine. The last mining work was done 1905-1906. Described Vol. II.

ASHBORO COPPER MINING CO.**NORTH CAROLINA**

Mine office: Ashboro, Randolph Co., N. C. H. D. Landers, pres.; D. M. Holliday, vice-pres.; W. C. Hammond, treas.; M. W. Parrish, sec. Organized under laws of North Dakota, capitalization \$100,000, shares \$1 par. Lands, 93 acres, just north of Ashboro. A carload of ore gave returns of \$16.85 per ton, with 8.6% copper and small gold values. Idle from 1907 to 1913, when work was resumed and shipments made.

ASIENTOS; COMPAÑÍA MINERA DE, S. A.**MEXICO**

Office: Tepezala, Aguascalientes, Mex. Abram Rapp, mgr. Organized June 3, 1900, under laws of Mexico, capitalization 1,000,000 pesos. Probably is the Mexican incorporation of Asientos Mining Co., or property under lease to that company.

ASIENTOS MINING CO.**MEXICO**

Address: B. Strouse, sec.-treas., Baltimore, Md. Mine office: Asientos, Ocampo, Aguascalientes, Mex. Chas. Adler, vice-pres.; Abram Rapp, gen. mgr. Organized 1898, under laws of Delaware, capitalization \$1,000,000, shares \$10 par, nonassessable; fully issued.

Lands, 190 acres, including the Nopensada and Alta Palmira mines, which are antiguas, and the Veta Grande and Refugio mines.

The Nopensada and Alta Palmira mines were leased Oct. 1, 1910. The

Nopensada, said to have been a considerable producer in early days, carries mainly slightly argentiferous copper ore, of about \$40 per ton average value. Equipment includes steam and electric power.

The Alta Palmira mine, having a 450' shaft, produces auriferous and argentiferous copper ore, and yielded, 1910, \$250,000 in gold, silver and copper. Equipment includes a 150-h. p. steam plant and hoist.

The Refugio mine shows ore carrying up to 10% copper and 1,100 grains silver per metric ton, with small gold values.

ASPEN MINE CO.

COLORADO

Idle. Property is the old Aspen mine at Silverton, Colo., supposedly controlled by American Smelters Securities Co.

ASTOR MINING CO.

COLORADO

Mine office: Eureka, San Juan Co., Colo. E. C. Condit, supt., at last accounts. Property includes the Surprise, Mogul and other claims, carrying ores of gold, silver, lead and copper. Has steam, water and electric power, and a 100-ton concentrator.

ATLANTA MINES CO.

NEVADA

Office and mine: 406 Columbia St., Goldfield, Nev. Henry Weber, pres. and mgr.; Arthur Weber, vice-pres. and sec.; L. L. Patrick, treas.; preceding officers, Thos. D. Murphy and W. E. Jeske, directors; P. J. Lynch, supt. Organized March 3, 1905, under laws of Arizona, capitalization \$2,000,000, shares \$1 par, nonassessable; issued \$1,900,000.

Lands, 5 claims, area 74 acres, patented, include the Atlanta, Black Bear and Union Jack mines. Property is developed by 11 shafts, deepest 730', with about 5,000' of workings. Equipment includes 9 small hoists and a 2-drill air compressor. Was in hands of leasers at last accounts.

ATLANTIC MINES CO.

MONTANA

Address: care Amalgamated Copper Co., 42 Broadway, New York. Ross W. Lynn, pres.; R. W. Myers, sec. Organized Jan. 20, 1913, under laws of Delaware, capitalization \$1,000,000, shares \$10 par; \$250,000 paid. Property, the holdings of the old La France Copper Co., including the Lexington mine and concentrating plant at Walkerville, Butte, Mont. Company is controlled by Amalgamated Copper Co. interests and was incorporated for the purpose of purchasing the Lexington group of mines at foreclosure sale. One share of new stock was issued for each \$100 bond of the La France Co. and 10% of face value of unpaid coupons, amounting to \$50,000, was paid in stock. Underwriters have option on 10,000 shares at \$14 a share for 12 months, 10,000 more for 18 months at \$18 and 10,000 for 24 months at \$22.

Lands, 8 fractional claims, area 32 acres, known as the Lexington mine, held from the French owners under a \$250,000 bond and lease, running in the name of Louis Girard, assigned to La France Copper Co. Property is at Walkerville, in the northern part of the Butte camp.

The Lexington mine has a 1,450' three-compartment main shaft, connected on the 600' level with the Alice mine, with several miles of workings. The mine was worked many years ago for gold and silver, but ore became base with depth. The lower workings carry an argentiferous and auriferous sulphide complex of chalcopyrite, galena and sphalerite, of which about 30,000 tons milled gave an average assay of 1.2% copper, 3.5% lead, 18% zinc, 5.5 oz. silver and \$1.60 gold per ton, which may be taken as a fair average assay of about 400,000 tons of ore blocked out in the lower levels. In addition there are several small bodies of chalcopyrite ore up to 3% in copper tenor, with proportionately higher gold and silver values, and having smaller quantities of zinc. There are electric pumps on the 650' and 1,450' levels capable of handling 500 gals. of water per minute.

Equipment includes a 20x60" Allis-Chalmers double-drum hoist raising 2 double-deck cages, a 15x30" Ottumwa auxiliary hoist raising a single-deck cage, and a 50-drill air compressor. There is a very complete surface plant, including a well equipped machine shop, carpenter shop, smithy, assay office and minor structures.

The old stamp mill, idle since 1893, has been dismantled, leaving about 100,000 tons of auriferous zinc tailings, which possibly can be handled at some future time.

A 200-ton experimental mill was built, 1907, near the mine, between Walkerville and Centerville, at a cost reported by the company as \$301,501. This mill used the magnetic separation process of Sutton, Steele & Steele, with no water, treating about 125 tons of ore daily, and milled about 30,000 tons of ore, but made such an insufferable quantity of dust that it was closed by the courts on an injunction sued out by the city of Walkerville.

The reduction plant, at Basin, was sold to another company in 1913.

The property of the company was sold for taxes, Aug., 1908, but was redeemed. The mine has been kept open, with a little work done in the way of experimental milling, and a small production secured, 1910 to 1913, by lessees. It was hoped that a combination process, devised by the General Engineering Co., of Salt Lake, would make possible the saving of 70% of assay values of the Lexington ores. This process calls for concentration on Wilfley tables, the roasting of concentrates, and magnetic separation followed by re-concentration of non-magnetic minerals. The property is capable of a large zinc production, if some satisfactory reduction process can be found. Production was 2,168,975 lbs. fine copper in 1907.

ATLANTIC MINING CO.

MICHIGAN

Office: 82 Devonshire St., Boston, Mass. Mine office: Painesdale, Houghton Co., Mich. Wm. A. Paine, pres.; Frederic Stanwood, sec.-treas.; preceding officers, John R. Stanton, J. Wheeler Hardley, S. L. Smith, Frank P. Son and J. H. Blodgett, directors.

Organized Dec., 1872, under laws of Michigan, reincorporated, 1901, for 30 years, and capitalization increased, 1902, to \$2,500,000, shares \$25 par; fully issued; paid in, \$11.80. Last assessment was \$2, Oct. 11, 1909, the first in 30 years. Has paid dividends of \$990,000, last in 1905. Owns \$40,000 stock in Michigan Smelting Co. Boston Safe Deposit & Trust Co., registrar; American Loan & Trust Co., Boston, transfer agent. Annual meeting, second Tuesday in March. The Atlantic Co. is controlled by Copper Range Consolidated Co., through ownership of 93,470 shares of the capital stock.

Lands, 8,217 acres, including 1,351 acres of mineral lands, 4,760 acres of timber lands, and 2,106 acres miscellaneous lands, latter including the mill site, and a valuable frontage on Portage lake. Mineral lands are S. $\frac{1}{2}$ of Sec. 4, except S. E. $\frac{1}{4}$ of S. E. $\frac{1}{4}$; N. $\frac{1}{2}$ of Sec. 9; N. W. $\frac{1}{4}$ of Sec. 10 and Sec. 16, all in T. 54 N. R. 34 W. Principal holdings are the old Atlantic mine, 640 acres, including the mines known before 1872 as the South Pewabic and Adams, located about 2 miles south of Portage lake and 4 miles southwest of Houghton, and the Sec. 16 tract of 640 acres. The mines, idle since 1911, are very fully described Vol X.

ATLAS EXPLORATION & MINING CO.

ARIZONA & MEXICO

Idle. Office and mine: Douglas, Cochise Co., Ariz. R. O. Johnson, pres.; N. W. Chase, treas.; D. T. Dunlap, sec., at last accounts. Organized June 14, 1902, under laws of Arizona, capitalization \$5,000,000, shares \$1 par. Annual meeting, first Tuesday in January. Has undeveloped mineral lands, known as the Atlas group, in the Warren district, of Cochise county, Ariz., and a prospect about 15 miles south of Douglas, in the northern

part of the Arizpe district of Sonora, Mexico, latter showing auriferous copper ore. No trace of operations secured.

ATLAS MINING CO.

YUKON

Office: Spokane, Wash. Mine office: Whitehorse, Yukon, Canada. Employs about 20 men. R. K. Neill, pres.; Wilbur D. Greenough, gen. mgr. Organized Dec., 1909, under laws of Washington, capitalization \$600,000, shares \$100 par.

Lands, 10 claims, area 720 acres, taken over from the Yukon Pueblo Mines Co., in the valley of Porter creek, 4 to 7 miles west of White Horse, including the Pueblo group of 420 acres, and the Carlisle group of 300 acres.

The Pueblo mine, mainly developed by opencast workings 215x325' in size, has an irregular orebody about 170x300' in extreme dimensions, with a surface section of about 33,000 sq. ft., proven depth of 100' by a shaft. The orebody apparently is entirely enclosed in crystalline limestone, near a granite contact, and apparently the limestone replaced by the orebody was cut by granite dikes, traces of which remain. There also is a porphyry dike of 3 to 4' width, crossing the orebody, decomposed and showing copper stains. Ore is essentially cupriferous hematite, varying in texture from compact to coarse, with some alteration, and with irregular silicification. The copper sulphides in the hematite have been largely altered into carbonates, oxides and silicates, only a little chalcopryrite having been found to depth of 100'. Principal ore mineral is malachite, disseminated in hematite, with considerable chrysocolla, and some cuprite occurring in veinlets and small masses. Ore ranges from 1 to 10% in copper, and 700 tons of roughly sorted ore sent to the Crofton smelter, carried 5% copper and 1.25 to 2 oz. silver and some gold per ton.

The Carlisle mine, 2 miles from the Pueblo, has a vein 15' wide, with a high-grade paystreak up to 4', of nearly solid bornite and chalcopryrite, developed by shafts of 50' and 137'. A smelter shipment of 100 tons gave returns of 22.64% copper and 6 oz. silver per ton.

Equipment includes steam power and a 10-drill air compressor, and necessary mine buildings were erected, 1910. Mine has a spur line to the White Pass & Yukon railway, built 1910.

Production, 1910, shipped to the Tacoma smelter, was 5,000 tons of ore, estimated to have yielded about 350,000 lbs. fine copper and 6,000 oz. silver. Property considered promising.

ATWOOD COPPER CO.

NEW MEXICO

Mine near Lordsburg, Grant Co., New Mexico. E. O. Aldrich, J. S. O'Donnell, Grist Florin, H. H. Smith, J. A. Craig and E. Fush, directors, all of Johnsonburg, Pa. A. W. Morningstar, mgr., at last accounts. Organized Aug., 1911, capitalization \$250,000, shares \$1 par. Company began business with \$3,000 cash. Property, the old Atwood mine, 3 miles from Lordsburg, developed by a 310' shaft with drifts on the 75 and 148' levels with about 600' of drifts and crosscuts on the 210' level exposing 2 veins of 4' and 12' average width, carrying copper ore with some gold and silver values. Has a small steam plant. Was shipping to the Copper Queen smelter at Douglas, 1912.

AUFEAS MINES, LTD.

BRITISH COLUMBIA

Address: Hope, B. C. Property, the Jumbo group on Silver creek, 4 miles west of Hope in the Yale district, B. C. Group comprises 3 claims, in steep gorge, 1,100' above sea level, containing fissure veins in granodiorite. Veins average 8" in width but carry arsenopyrite and chalcopryrite in quartz. Gold is the principal value and the ore varies from \$10 to \$60 per ton. Development is by 3 tunnels and several open cuts. A new tun-

nel driven in 1913 cut a vein 3' wide 385' from portal at depth of 450'. Ore in this face carried more copper than found in the older workings. An aerial tram is to be installed and shipments made to the Tacoma smelter.

AURELIA CROWN CO.

WASHINGTON

Office: P. O. Box 187, Seattle, Wash. O. Robert Dahl, pres., treas. and gen. mgr.; A. E. Coxhead, vice-pres.; H. M. Dahl, sec.; preceding officers, Geo. C. Whipple and L. A. Sherman, trustees. Organized under laws of Washington, capitalization \$10,000,000, shares \$10 par, nonassessable; issued \$8,137,600.

Lands, 36 claims, area 730 acres, and 2 mill sites of about 10 acres, are located some 16 miles west of Lucerne. Property includes gold, copper, silver-lead and molybdenite mines, having 8 tunnels, of about 1,300' aggregate length, and several open cuts. The Crown Point molybdenum mine has 3 tunnels, said to develop 2,000 tons ore. The Silver Trail silver-lead mine has a 6' fissure vein. Tunnel No. 3, on the copper vein, shows 4 ore shoots, of 4 to 8' width, carrying ore said to give average assays of 15.5% copper and \$8.65 gold and silver per ton. Mine has an aerial tram.

Equipment includes a hydraulic plant, with 2 Pelton wheels and 832' of 10" and 11" and 472' of 6" double-riveted steel hydraulic pipe. There is an air compressor. Buildings include a machine shop, engine house, sawmill, warehouse and 3 cabins. The mill has 2 crushers, rolls and a Schull concentrator.

Company makes claims of large annual profits to be earned from the operation of its mines, sawmill, water power plant and in water and rail transportation, but the railroad is yet to be built, the mines are only slightly developed and the tonnages which would make annual earnings of \$2,800,000 possible, are neither blocked out nor reasonably assured. The total expenditure on the property to Jan. 1, 1913, is \$86,552, a small sum compared with the amount of stock issued. The company's circulars considered misleading and not liked.

AURORA COPPER MINING CO.

WASHINGTON

Office and mine: Chewelah, Stevens Co., Wash. Conrad Wolfe, pres. and mgr. Property is the Copper Queen mine adjoining the United Copper Co.'s property, 6 miles northeast of Chewelah. Is developed by tunnels, and 2 deep diamond-drill holes recently completed. Ore contains chalcopryrite with streaks of tetrahedrite in a vein of 25' average width. Ground was broken, early 1913, for a 100-ton concentrator, of similar design to that of the United Copper Co., to be operated by electric power supplied under 10-year contract by the West Kootenai Power & Light Co. A rope tram a mile long will carry ore to the mill. Mine employs about 30 men.

AURORA GOLD & COPPER MINING CO.

COLORADO

Idle. Mine office: Central City, Gilpin Co., Colo. Organized June, 1909, under laws of Colorado, capitalization \$1,000,000. Property, developed by a 400' shaft, includes the Aurora mine at Russell Gulch, and lands in Clear Creek county, Colo. Percy R. Alsdorf, supt., at last accounts.

AURORA; MINA LA.

MEXICO

Owned by Teziutlan Copper Mining & Smelting Co., at Aurora, Teziutlan, Pueblo, Mex.

AURORA Y ANEXAS; CIA. MINERA LA, S. A.

MEXICO

The Cia. Minera Aurora y Anexas owned by late Ernesto Madero and brother has worked for several years past, the Aurora mine, with 160 hectares in the Cuchillo district, near Coyame, Chihuahua and the Justicia copper mine, 4 miles east of Marquez station on the Kansas City, Mexico & Orient railroad. These properties were purchased from Don Francisco Diaz in 1908.

Owing to the revolution against President Madero and the confiscation of all the family properties, followed by a revolt and establishment of local revolutionary government in Chihuahua, it is impossible to get recent information; letters addressed to the mine are returned stamped, "office closed."

AVINO MINES, LTD.

MEXICO

Office: 638 Salisbury House, London, E. C., Eng. Mine office: Avino, Gabriel, Durango, Mex. Lionel W. Harris, chairman; Edw. Hooper and Capt. C. L. Willoughby Wallace, directors; F. F. Fuller, sec.; Hooper, Speak & Co., cons. engrs.; R. H. Jeffrey, gen. mgr. Organized March 6, 1909, under laws of Great Britain, capitalization £100,000, in 1,000,000 priority shares and 1,000,000 deferred shares of 1s. par; issued, 484,691 priority shares and 978,429 ordinary shares. Was a reconstruction of Avino Mines of Mexico, Ltd., which was reorganized Feb. 24, 1903, as successor of company of same name, organized Feb. 13, 1899, which was the successor of Avino Syndicate, Ltd. Present company took possession of property Aug. 1, 1909. Stockholders of old company were given 1 ordinary share, par 1s., fully paid, for each fully paid £1 share of the old company, with the right to buy priority stock at par, share for share. After payment of 200% on priority shares, they became ordinary shares. Shares are listed on the London Stock Exchange.

Accounts for year ending June 30, 1912, showed £26,495 expended in Mexico of which amount £8,484 was for mining costs and £15,324 for freight and shipping charges; ore sales £29,504 and net loss for year's operations £14 10s., leaving profit and loss account £3,718.

Lands, 166 acres, and a 350-acre dam site, 10 miles from Gabriel, on the Mexican International railway, the nearest rail point. Property includes El Sangre de Cristo mine, which has a 500' shaft and 1,050' tunnel, with several large tajos or pits, 1 being nearly 400' in width and of considerably greater length.

New development in 1912 comprised 294' shaft sinking with stations cut on 10th, 11th, 12th and 13th levels, and 668' of drifting, etc., on 4th to 9th levels. During the year 16,288 tons of ore was mined of which 9,092 tons was shipped to the smelter, 300 tons added to reserves at surface and 6,896 tons thrown on dump. Total tonnage since April, 1909, 89,680 tons extracted, and 42,600 shipped. Reserves estimated June, 1912, at 107,167 tons, with 52,500 tons blocked out for stoping; 36,500 tons probable ore and 18,167 tons on ore pile at surface.

These figures make no allowance for ore opened up below the 9th level, where recent work has shown large amounts of ore whose limits are not yet determined. Ore is a complex mixture of auriferous and argentiferous lead and copper sulphides.

Equipment includes a steam and a 300-h. p. electric plant, operated by a Crocker-Wheeler gas engine.

A large concentrator found unsuitable, was replaced by a hyposulphite lixiviation plant, which was claimed to save 85% of the silver and 30% of the gold values. Present mill, of 150 tons daily capacity, putting about 2½ into 1, has a Wood mill, installed 1909, and tailings therefrom are sized and fed to Wilfley and Deister tables.

The former management spent too much money on surface, and not enough underground, besides making a mistake in the plan of ore treatment. The mine has a considerable amount of ore, of low average grade and now has competent consulting engineers and managers, and ought to make money in 1913.

From April 28 to Sept. 21, 1909, production was 2,834 metric tons of

ore, of which 2,397 tons was shipped to smelters, returning an average of only 16.49 pesos per ton, with working costs of about 11.84 pesos. Production, for 14 months to June 30, 1910, was 43,350 long tons of ore, of which 17,937 tons was rejected and 18,094 tons shipped, yielding 910,499 lbs. fine copper, 261,000 oz. silver and 993 oz. gold, giving a profit of £4,338. Operations during 1912 were seriously interrupted by revolutionary disturbances.

AXLEY COPPER CO. NORTH CAROLINA & TENNESSEE

Office: 805 James Bldg., Chattanooga, Tenn. Mine office: Ducktown, Polk Co., Tenn. W. W. Axley, pres. and gen. mgr. Organized Nov. 6, 1909, under laws of Tennessee, capitalization \$100,000. Lands in Cherokee county, N. C., just over the line from Ducktown, include the Mangum mines, area 1,000 acres, of the Isabella lead, worked previous to the American Civil War, when ores were shipped, via Chareston, to Swansea, for smelting. Ores so shipped were said to average 5 to 8% from chalcopryrite and 34% from black copper oxide, which presumably was chalcocite. No trace of operations secured.

AYUTLA SMELTER. MEXICO

Owned by Carrizo Copper Co., at Ayutla, Autlan, Jalisco, Mex.

AZTEC COPPER CO. NEW MEXICO

Office: 712 Colorado Bldg., Washington, D. C. Mine office: Organ, Dona Ana Co., N. M. Gen. H. H. C. Dunwoody, pres. and mgr.; Gen. B. K. Roberts, sec.-treas.; preceding officers, Col. M. C. Wyeth, C. E. Humphreys, C. B. Hall and C. C. Clements, directors. Organized under laws of Arizona, capitalization \$1,000,000, shares \$1 par, nonassessable. Lands, 7 claims, area 140 acres, located in the Organ Mountain mining district, about 12 miles by good road southeast from Las Cruces. Claims cover the mineralized limestone porphyry contact worked by the Modoc mine. Developments are in the Orejon claim opened by a 130' 45° inclined shaft, sunk on a 12 to 18" vein, from which a small shipment of ore was made Dec., 1911, yielding 8.5% copper and 23 oz. silver per ton.

AZTEC COPPER SMELTING CO. MEXICO

Office: 1309 Stephen Girard Bldg., Philadelphia, Pa. Operating office: Apartado 345, Guadalajara, Mex. Mine office: Guachinango, Mascota, Jalisco, Mex. Dr. Pemberton Dudley, pres.; J. W. Tyrell, vice-pres.; Geo. J. Graham, mgr.; preceding officers, Perry H. Dudley, G. H. D. Martin, F. B. Graham, Wm. A. Young and E. J. Fithian, directors; J. F. Graham, sec. Organized June, 1901, under laws of New Jersey, as successor of the Aztec Copper Mining & Smelting Co., capitalization \$300,000, shares \$1 par.

Lands claimed are 10,000 acres, of which 8,000 acres are said to be well timbered with oak and pine, and to be well watered, with an available water power on the Rio Ameca, central Jalisco. Lands include 2 mines, known as La Concha and La Perla, opened by shafts and tunnels, claimed by company to show ore averaging about \$30 per ton in values. Has an 80-ton concentrator with 2 Elspass mills and 6 tables. No recent returns secured.

AZTEC GOLD & COPPER MINING CO. COLORADO

Geo. F. Bradstreet, sec., 67 Milk St., Boston, Mass. Property shut down, company out of funds and expected to be reorganized. Described Vol. X.

AZTEC MINES CO. ARIZONA

Letter returned unclaimed from Chicago office. Mine office: Prescott, Yavapai Co., Ariz. Perry L. Turner, pres.; Col. Emil Rautman, sec.-treas. and gen. mgr.; preceding officers, F. N. Thompson, D. V. R. Manley and C. A. Baker, directors. Organized 1908, under laws of Arizona, capitaliza-

tion \$3,500,000, shares \$1 par, practically as successor of Gold Copper Mining Co.

Lands, 7 claims, area 100 acres, well timbered and watered, 5 miles west of Poland and 13 miles south of Prescott, in middle of the Senator district, near the Hasayampa river. Property includes the Aztec, Peacock, Mountain View and Iron Duke claims, said to show fissure veins of 2 to 15' width. Main development on the 15' vein, by a shaft cutting auriferous and argentiferous copper ore. A tunnel 750' long, July, 1912, is intended to open up the main vein through the 3 claims, and will have a back of about 500'. The ore from the main shaft on the Peacock claim is reported to average \$13 in copper and \$9.92 in gold. Besides 2 main veins of the group there are 8 other cross and parallel veins on the claims.

Past history of company, with Mr. Stevens' unfavorable comments, given Vol. X.

AZTEC MINES CO.

COLORADO

Idle. Property is the O. K. mine at Central City, Colo. A. H. Frost, pres., and J. R. Hastings, sec. and mgr., at last accounts.

AZTEC TURQUOISE CO.

ARIZONA

Office: 12 John St., New York. Mine office: Kingman, Mohave Co., Ariz. John Elsey, pres.; E. R. Grant, sec.; E. J. McNulty, gen. mgr. Lands, 12 claims, patented, including the Monte Cristo mine, in the Mineral Park district, 12 miles north of Kingman, carrying copper ore below the turquoise mine, already developed.

Mineral Park district is one of the foremost producers of turquoise in the United States. The Aztec Co. and about 6 other companies are all operating on a small hill called Ithaca peak. The gems occur as irregular seams in porphyry dikes which are generally believed to be a "blossom" of the underlying bodies of copper ore. Copper is found in small quantities in every mine in the district.

AZTECA MINING CO.

MEXICO

Idle. Mine office: Ayutla, Autlan, Jalisco, Mex. Juan D. Isabel, pres. and gen. mgr., at last accounts. Capitalization \$500,000. Property includes El Zopilote and La Trinidad mines, at Ayutla, and the San Francisco mine, near Carrizo, the former carrying copper ores and the latter carrying silver-lead ore.

AZURE MINING CO.

NEW MEXICO

Office: 170 Broadway, New York. Mine office: Tyrone, Grant Co., N. M. Employs 30 men, when in full operation. Louis Kahn, pres.; M. D. Rothschild, sec.-treas.; Wm. Rogers Wade, supt. Organized 1890, under laws of New York. Is operated as a close corporation.

Lands, 110 claims, area 1,800 acres, near the Burro Chief group of the Chemung Copper Co. Company sold 73½ acres, 1909, to Mangas Development Co.

Property shows monzonite, quartz-porphyry and granite, with fissure veins in granite and disseminated ore in porphyry, there being 7 orebodies with 2 under development. The Santa Fé vein is from 15 to 75 wide, averaging 40' and is traceable for 6,000'. This vein is developed by a 417' shaft, having 5 levels with 15,500' of workings showing gem turquoise as well as copper ore. The old turquoise mine has 2 tunnels and large open-cast workings, 80' in extreme depth with width of 150' and length of 750', also having considerable stoping underneath.

Besides the Santa Fé vein, the property has disseminated ores, one orebody on the contact between granite-porphyry and monzonite-porphyry being 152' thick, developed for 500' in length and carrying 2½% copper

present as disseminated particles of chalcocite. Property has been explored by churn drills and diamond drilling.

The mine was at one time the largest turquoise property in the world, systematic mining having begun in 1891. Gem production has practically ceased and the property is considered valuable for its copper ore alone.

AZURITE MINING CO. NEVADA

Office: 941 W. 35th St., Los Angeles, Cal. Mine office: Goodsprings, Clark Co., Nev. A. C. Black, pres. and purch. agt.; James McCorkindale, vice-pres.; J. W. McFatridge, sec.-treas.; preceding officers, M. P. Erwin, T. D. Knights and Samuel Yount, directors. Organized Feb. 7, 1911, under laws of Nevada, capitalization \$1,000,000, shares \$1 par, nonassessable; issued 415,000 shares.

Lands, 11 claims, area 220 acres, and a 3-acre smelter site, in the Yellow Pine district near the California-Nevada boundary and near Jean on the Salt Lake railroad. Property shows several orebodies of irregular size and shape, the largest 35x40' and 8 to 10' thick. These replacements occur in thick bedded limestones cut by porphyry dikes. The Azurite copper mine has a 90' incline shaft. Property has 673' of workings, including a 450' tunnel, estimated to block out 5,500 tons of 20% copper ore and 30% lead ore.

Company plans 100' of tunnel work with crosscuts and upraises for 1913. Company bought the Nevada Copper Realty property, Feb. 7, 1911. The proposed branch of the Salt Lake railroad from Jean to Good Springs will open up this district and enable many of the mining companies to ship ore.

AZURITE MINING CO. WYOMING

Idle. Office: 55 High St., Oshkosh, Wis. Henry L. Larsen, pres., Green Bay, Wis.; Arthur Bishop, vice-pres.; H. O. Granberg, sec.-treas. and gen. mgr. Organized Dec. 17, 1904, under laws of Wyoming, capitalization \$1,000,000, shares \$1 par; issued, \$624,650. Lands, 5 claims, area 63 acres; in the Battle Lake district, near Dillon, in Carbon Co., Wyo., showing 3 fissure veins, in gabbro, of 15 to 20' estimated width, opened by 305' of work, including a 65' shaft and 70' tunnel, showing ore giving assays of 18% copper. Company paying taxes yearly.

BABOQUIVARI COPPER CO. ARIZONA

At Tubac, Santa Cruz Co., Ariz. J. C. Erman, pres. and gen. mgr., in 1911. Mine 40 miles west of Amadoville and north of Tubac. Property, 60 claims prospected by 325' tunnel on 8' vein, has a good surface showing of copper ore; 20% of ore mined is shipped to El Paso and is said to average 20% copper, 50 oz. silver and \$20 gold per ton.

BACA ORTIZ; COMPANIA RESTAURADORA DE MEXICO

Mine office: Tepehuanes, Santiago Papasquiaro, Durango, Mex. Property is the Candelaria mine, carrying auriferous and argentiferous copper ore. Idle on account of revolution, in 1912-13.

BADGER GROUP OF COPPER MINES. IDAHO

Owned by P. H. Miller, Idaho; Fred J. Acton, Mayville, Wis., and J. P. Hoffman, Pittsburgh, Pa. P. H. Miller, gen. mgr. Mine office: Cuprum, Adams Co., Idaho. Property in Seven Devils district, 12 miles from N. W. branch O. S. L. railroad. Comprises 7 claims, on Horse mountain, covering a mineralized monzonite-porphyry dike 100' wide, cutting andesite. Elevation at Badger mine 5,600'. Discovered 1898. Reopened 1907.

Badger mine has 200' tunnel on shoot of oxide and sulphide ore, said to average 3½% copper, with gold and silver values. Shipping ore from tunnel carries \$11 gold, 6.3 oz. silver and 26.7% copper. On other claim,

gossan outcrop 30' high, caps sulphide ore carrying 2.8% copper and \$1.50 gold and silver per ton.

Badger No. 2 and 3 outcrop is reported as 100' wide, 800' long and to stand high above the surface. Orebody consists of brecciated porphyry, whose fragments are cemented by ore. Empire outcrop, as large as last, and 100' wide, has lime contact carrying ore. Surface said to average 2% copper.

Development by three shafts, 20', 40' and 90' deep, and 4 tunnels, 20', 60', 70' and 300' long. There is no positive ore, but workings are said to be all in ore. Some 50,000 tons probable ore is said to be available by open-cut work. Property, like others in Seven Devils district, has to team ore to railroad and cannot handle low-grade ore. Regarded as a promising prospect.

BADGER STATE MINING & MILLING CO.

WYOMING

Idle and probably dead. Office and mine: Saratoga, Carbon Co., Wyo. Gustav Jensen, pres. and mgr.; John H. Davis, vice-pres. and supt.; C. E. Jensen, treas.; A. H. McDougal, sec. Organized Dec. 26, 1901, under laws of Wyoming, capitalization \$1,000,000, shares \$1 par. Lands, 8 claims, area 140 acres, on Jack creek, showing 3 fissure veins, averaging 4' width, claimed to give average assays of 50% copper, 50% lead and from a trace up to 400 oz. silver per ton, opened by shafts of 60 and 105', and by a 90' tunnel.

BADGER-HALL MINING CO.

ARIZONA

Office: 1125 G Ave., Douglas, Ariz. Mine at Paradise, Cochise Co., Ariz. H. C. Beumler, pres.; C. P. Harvey, vice-pres.; S. S. Badger, sec., all of Douglas, Ariz. Organized 1907, under laws of Arizona, capitalization \$1,000,000, shares \$2 par, fully paid. Is controlled, through ownership of 60% of stock issue, by Bisbee-Sonora Development Co. Property, 30 claims, area 545 acres, said to show an orebody 62' wide at surface and 50' wide at depth of 200', opened by tunnel.

BAGDAD COPPER CO.

ARIZONA

Office: 1200 Union Trust Bldg., Los Angeles, Cal. Mine at Bagdad, via Hillside, Yavapai Co., Ariz. Capitalization \$6,000,000, shares \$5 par. Stock control held by Arizona Nevada Co. In May, 1911, an unsuccessful attempt was made to finance the company by the offer of 100,000 shares to the public at \$4 a share. In Oct., 1912, a 2-year bond on the property was given to the General Development Co. of New York (Lewisohn), and this company at once began drilling operations to develop more ore. The results of this work with 3 churn drills up to April, 1913, being unsatisfactory, the bond was relinquished.

Property embraces the original 8 claims of Lawlor and 158 others, 70 of which are said to be patented; total area, 3,000 acres. Claims are in the Copper Creek region, Eureka district, Yavapai Co., 26 miles by wagon road from Hillside, which is on the Santa Fe line to Phoenix. Company has spent \$400,000 on the property and developed 4,324,500 tons of concentrating ore carrying 1.9% copper. Property regarded as valuable, but developed tonnage too small to warrant building a railroad and therefore a mill. Future lies in developing more ore, since it is not certain that the last work done has exhausted the possibilities of the ground.

BAGDAD MINING & MILLING CO.

CALIFORNIA

Presumably idle. Mine office: Bagdad, San Bernardino Co., Cal. John Denair, pres.; Norman E. Rich, vice-pres.; W. I. Coapman, sec.; preceding officers, C. E. Hunter and Geo. E. Mills, directors. Organized Jan., 1910, as successor of Orange Blossom Mining & Milling Co. Fully described Vol. X.

BAJA y SANTA ROSA; CIA. MINERA y BEN. DE LA. MEXICO

Idle. Mine office: Trinidad, Sahuaripa, Sonora, Mex. Property is La Azogueria mine, carrying argentiferous and auriferous copper ore, also La Bonanza y Anexas group, carrying gold-copper ore.

BAKER CONSOLIDATED COPPER CO. ARIZONA

Idle. Letter unclaimed at former office, Tucson, Ariz. Mine office: Cerro Colorado, Pima Co., Ariz. Chas. E. Udall, mgr., at last accounts. Property shows mainly gold and silver ores. Equipment includes steam power and an air compressor. Has a 20-ton mill and concentrator with 5 stamps.

BAKER CONS. COPPER MG. CO. CALIFORNIA & GEORGIA

Office: 142 Bagg St., Detroit, Mich. Mine office: Pierceville, Fannin Co., Ga. John Baker, pres. and gen. mgr. Property, across the river in Georgia from the Tennessee mine, in operation, 1910. Company owns 1,250 acres of patented mineral land in Siskiyou county, Cal. Formerly held the United and Queen copper groups, now known as the Oregon Consolidated mine, at Copley, Shasta Co., Cal. No trace of operations secured. Is not regarded favorably.

BAKER MILLING, SMELTING & REFINING CO. OKLAHOMA

Office: 4 Campau Bldg., Detroit, Mich. John Baker, pres.; John E. Rolland, sec.-treas. Organized under laws of Oklahoma, capitalization \$10,000,000. President claimed to be putting a plant in Detroit, to be in operation during 1906, but no such plant materialized. President Baker writes that he has never deceived anybody, and simply holds the charter, keeping it in force for the present, with no stock for sale, and would deem it a favor if no mention of the company were made in this work. Is regarded with suspicion. Letter returned unclaimed June, 1913.

BALAKLALA CENTRAL MG. & SMELTING CO. CALIFORNIA

Address: Coram, Shasta Co., Cal. Thos. J. Barbour, pres.; J. C. Montgomery, vice-pres.; W. M. Downs, sec.; preceding officers, T. M. T. Raborg and J. R. Howell, directors. Organized under laws of Wyoming, capitalization \$5,000,000. shares \$5 par; one-third of issue owned by Balaklala Consolidated Copper Co. Owns 3 claims surrounded on all sides by Balaklala Consolidated Copper Co.'s holdings and supposed to contain the extension of the Balaklala orebodies.

BALAKLALA CONSOLIDATED COPPER CO. CALIFORNIA

Office: 111 Broadway, New York. Mine office: Kimberly, Shasta Co., Cal. Works office: Coram, Shasta Co., Cal. Frank M. Leland, pres.; W. H. Brevoort, vice-pres.; W. A. Kerr, sec.; T. M. T. Raborg, treas.; preceding officers and Edgar L. Newhouse, directors; R. T. White, gen. mgr.; H. F. Wierum, metallurgist; E. H. Braden, cons. engr.; Jas. Doyle, mine supt. Organized Feb. 24, 1906, under laws of Nevada, capitalization \$10,000,000, shares \$25 par. Bonds were \$1,500,000, but have been retired, last lot of \$375,000 having been paid July, 1910. Company was a reorganization of the Balaklala Mining Co., control of which was sold simultaneously to two parties, making a snarl requiring reconstruction to untangle. Is controlled, through ownership of entire stock issue, by the First National Copper Co. Is dominated by the Guggenheim interests. Windsor Trust Co., New York, and Federal Trust Co., Boston, transfer agents; Trust Company of America, New York, and First National Bank, Boston, registrars. For 1910 gross income was \$2,521,790.

Property, 65 claims, patented, 1,169 acres, also 800 acres of miscellaneous lands, including a smelter site, the town site of Coram and right-of-way for tram line. Mineral holdings are at Kimberly in the Flat Creek district, 4 miles northeast of the Iron Mountain mine, and adjoin the Trinity mine.

Property reported to carry 5 orebodies, with 2 developed. Apparently 4 orebodies are portions of the same ore zone, separated by faulting. Lands carry 3,040' of the strike of the main ore zone, developed for about 1,100'. Country rock is rhyolite, ore occurring in lenticular masses as replacement of country rock, in flat bodies, with slight dip to north, and greatest extension east and west, with a series of north and south step faults, causing displacement from a few feet to more than 100'. The two main orebodies are developed for lengths of 900' and 1,100'. Ore is cupriferous pyrite, copper values being mainly in chalcopyrite, with a little chalcocite and covellite, all carrying gold and silver values, estimated by management to average about 2.65% copper, 0.9 oz. silver and 50 to 60 cts. gold per ton. The larger orebody developing about 1,000,000 tons, gives a typical analysis of 2.7% copper, 0.95 oz. silver, 0.03 oz. gold, 21.4% silica, 31.5% iron, 0.3% lime, 3.4% alumina, 2.2% zinc and 35.2% sulphur.

Principal workings are known as the Windy Camp and Weil. The mine has large reserves of low-grade ore. Development is by a large glory hole, and by tunnels, with upraises, providing for open-cast mining, giving cheap extraction, there being about 20 tunnels, including the Weil tunnel of nearly 6,000' length. Mining operations were resumed Aug., 1913; with 22 men breaking ore.

Power equipment includes a steam plant installation of about 1,000 h. p. and electric power. Machinery includes a number of hoists, 5 compound air compressors and about 40 rock drills. Buildings include an office, store, school, hospital, sawmill and about 75 dwellings, all but the necessary mine buildings being located in the town site at the smelter.

The mine and smelter are connected by a Bleichert aerial tram of 16,130' length, of 75-ton hourly capacity, operated by gravity, having 62 wooden towers, highest 85'. The 1,700-ton smelter is thoroughly modern and well equipped. Ore passes through 4x10' revolving sizing drums, coarse material going to the blast furnaces and fines to the calciners. The 500' bin house has bins for ore, fluxes and fuel. The roast building has four 50-ton McDougal calciners.

The furnace building, of steel frame, no wood being used, has three 600-ton water-jacket blast furnaces, each 56x240", first blown in Oct., 1908, and a 17x96' reverberatory furnace, of 150 tons daily capacity, for fines, burning petroleum, the waste heat generating power in 2 Stirling boilers, the power house having 3 additional Stirling boilers, burning petroleum. The converter plant has 96x150" shells of horizontal type, and an electric traveling crane. The product when operating is 99% blister copper carrying 75 oz. silver and 1.5 oz. gold per ton, sent to Perth Amboy works for electrolytic refining. Power plant includes 3 Connorsville blowers, each driven by a 450-h. p. tandem compound steam engine, direct-connected. The slag line has electric locomotives. The smelter stack, 275' high and 20' in diameter, was torn down, 1913, and a new steel stack is being erected.

Although the smelter is about 14 miles from the nearest cultivated lands, the "smoke farmers" of northern California were busy and controversy with the Shasta County Farmer's Protective Association, led to the installation of the Cottrell electrolytic fume process which proved a failure after \$120,000 had been spent for its installation. The Young process used at Campo Seco (Penn Mining Co.) was also unsuccessful and now, the Hall process will be tried. This process extracts the sulphur as native sulphur 99 $\frac{1}{4}$ % fine, after which the ores are smelted. The cost of extraction is estimated at \$5 per ton and the product saleable at \$30 per ton. The smelter is now being put in shape for a trial of this process.

The record of smelting operations of the company as shown by the

annual reports, gives the ratio of ores smelted, as 1 ton of silicious ore to 14.1 tons of sulphide ore. The total burden to blast furnaces was composed of 70.6% sulphide ores; 11.3% silicious ores; 2.6% flue dust and 17.3% lime rock. The percentage of ore treated by blast furnace was 99.38%, 0.62% of silicious ores being used as converter lining. Smelting cost \$3 per ton. Coke consumed equaled 1 ton for every 17.1 tons handled, or 1 ton for every 14.9 tons of copper-bearing material treated. The percentage of coke to total burden was 5.90%, and of coke to sulphides, 7.58%.

Flue dust produced equaled 1 ton for every 49 tons of copper-bearing material treated, or 56 tons of burden. Of the total metal contents of the material treated, the flue dust contained: 1.49% of the gold, 1.21% of the silver, and 2.24% of the copper, or approximately 2.12% of the total value in dollars.

The average furnace burden per day was 453 tons, and of sulphides 352 tons. Two 52x240" water-jacketed blast furnaces were operated during the time this record was made.

The detailed estimates of costs given in Vol. VIII, have been borne out by actual results, and the estimate of a maximum extraction of 2.25% copper was verified by the average recovery of 2½% copper and \$1 per ton in gold and silver, or practically 2 cts. per lb., effected in 1910. The management estimates that copper can be laid down in New York for 10 cts. per lb. with 3 furnaces running, but only 2 furnaces have been in blast at once, and management estimates a cost of 11 cts. per lb., delivered, with 2 furnaces, or 12 cts. per lb. with one furnace. Taking everything into consideration, the figures of Vol. VIII, of minimum cost of 11½ cts., or maximum of 14¼ cts., seem to hold good. After 7 months' idleness, 1 furnace was blown in Dec. 28, 1910. Actual recovery, 1909, was exactly 2½% copper, 2.54 oz. silver and 0.078 oz. gold per ton, giving an average value of about \$1.50 silver and \$1.60 gold per ton, or 6.6 cts. per lb. of copper, this including custom ore smelted. The company had some financial troubles during the panic period and has been greatly hampered by fume litigation, and after long litigation smelter was shut down by an injunction of the U. S. Court. Despite an offer by the company to set aside an indemnity fund of \$250,000 to be used to pay farmers' damages, the senseless opposition of a few small farmers has kept this mine and smelter closed and lost employment for hundreds of men. As a result the company has sold its immense piles of coke and other stores. Shipments of ore to Anaconda, Mont., for treatment by the Bradley process were not successful.

Ore reserves, Dec. 31, 1910, were 1,334,013 tons of 2.83 % copper ore with 1.32 oz. silver and 60 cts. gold per ton. Production in June, 1911, was 671,168 lbs. copper with nothing since. Production, 1910, was 8,451,653 lbs. fine copper, and in 1909 was 11,569,314 lbs. copper, 633,282 oz. silver and 19,289 oz. gold.

Property considered good and capable of making money with copper at 14 cts. provided some settlement could be made with the farmers, or a process found for elimination of the sulphurous fumes. Like Trinity Copper, it was once a member of the Thos. W. Lawson family, but has survived. Company has \$450,000 in First National Copper Co. treasury and can produce 10,000,000 lbs. per year at a fair profit, if allowed to operate.

BALAKLALA COPPER CO.

CALIFORNIA

Reorganized as First National Copper Co.

BALBACH SMELTING & REFINING CO.

NEW JERSEY

Office: 580 Market St. Works: 111 Passaic Ave, Newark and on Newark Bay, N. J. Edward Randolph, pres.; Jacob Langeloth, vice-pres.; F. Schmutzer, sec.-treas.; E. E. Dieffenbach, supt.; preceding officers, C. M.

Loeb and Jas. F. Bless, directors. Organized 1891, under laws of New Jersey, capitalization \$600,000, shares \$100 par, nonassessable, in \$300,000 preferred and \$300,000 common stock.

Property is an electrolytic refinery, having in connection a small smelting plant. The refinery has 444 tanks, in parallel, with two 360-kw. generators. Plant has a capacity of about 3,600,000 lbs. electrolytic copper per month, employing 150 men. The metallurgical practice of the works ranks deservedly high. Production, 1912, was about 22,000 tons of electrolytic copper. A new lead refinery, erected at the Newark Bay property to take the place of the plant on Passaic Ave., Newark, went into operation July, 1913.

BALD MOUNTAIN MINING CO.

WASHINGTON

Idle. Mine near Clear Lake, Skagit Co., Wash.

BALD MOUNTAIN MINING & SMELTING CO.

MONTANA

Idle. Mine near Saltese, Missoula Co., Mont. E. W. Conrad, supt., at last accounts. Was developing, with a small force, 1907-11.

BALL COPPER CO.

ARIZONA

Office: 723 Title Ins. Bldg., Los Angeles, Cal. Mine office: Winkelman, Pinal Co., Ariz. Chas. E. Finney, pres.; Edward W. Brooks, vice-pres.; Robt. J. Simpson, sec.-treas.; preceding officers, A. C. Finney, C. T. Joslin, D. W. O'Carroll and C. E. Finney, Jr., directors; Harry Scott, supt., C. E. Finney, Jr., purch. agt. and assayer. Organized Feb. 1, 1908, under laws of Arizona, capitalization \$3,000,000, shares \$10 par; \$1,250,000 issued. Bonds, \$50,000 outstanding, at 6%. Annual meeting, third Tuesday in January. Company owns 40,000 shares of the London Arizona Consolidated Copper Co., and has transferred its mineral claims to that company; they are described under that title.

BALTIC MINING CO.

MICHIGAN

Office: 82 Devonshire St., Boston, Mass. Mine office: Baltic, Houghton Co., Mich. Works office: Redridge, Houghton Co., Mich. Wm. A. Paine, pres.; Frederic C. Stanwood, sec.-treas.; preceding officers, Samuel L. Smith, J. Henry Brooks, R. Townsend McKeever and Thos. S. Dee, directors; Fred W. Denton, gen. mgr.; W. H. Schacht, asst. gen. mgr.; John Jolly, underground supt.; Edw. Koepel, mill supt.; O. D. Fellows, foreman; H. T. Mercer, engr.; Wm. C. Cole, clerk; W. J. Richards, master mech.; John Wagner, purch. agt.

Organized Dec., 1897, under laws of Michigan, capitalization \$2,500,000, shares \$25 par; fully issued, \$18 paid in. Is controlled, through practically entire stock ownership, by Copper Range Consolidated Co. Owns \$80,000 stock in the Michigan Smelting Co. Annual meeting, first Monday in March. Paid dividends of \$7,750,000 to end of 1912, dividends being \$12.50 in 1905; \$14 in 1906; \$10 in 1907; \$9 in 1908; \$10 in 1909; \$10 in 1910; \$5 in 1911; \$7 in 1912. Net earnings, 1912, were \$697,393.85, and company ended the year with a surplus of \$306,106.35.

Lands, 800 acres, near the eastern limit of the Michigan copper belt, about 75 acres being on the eastern sandstone and non-mineralized. Holdings comprise all of Sec. 21 except the S. E. $\frac{1}{4}$, and W. $\frac{1}{2}$ of Sec. 20, T. 54 N., R. 34 W. Lands are bounded on the north by the Wheal Kate and Sec. 16 of the Atlantic; on the east by St. Mary's Mineral Land Co.; on the south by St. Mary's lands, lands of Hussey, Howe & Co., and the Trimountain mine; on the west by the Trimountain. Exchanged 39 acres, 1905, with the Atlantic mine, which will enable the Baltic to sink No. 5 shaft to much greater depth than otherwise possible. To the southward the Trimountain and Champion mines are opened on the same bed, which has a strike of N. 63° E., from Baltic shafts 2 to 5, and to the north-

ward is the Superior mine, on the same bed. The dip of the bed averages about 73°, being the sharpest of any developed cupriferous bed in the Lake district.

The Baltic amygdaloidal bed, taking its name from its first mine, was opened in 1882, but abandoned at 90' depth, because a wrongly pitched drill hole ran into the hanging wall. The Baltic is an exceptionally strong bed, ranging 15 to 60' in width, so well mineralized that at most points it can be more or less thoroughly stoped from wall to wall. The great width of the stopes has brought about the use of a walling system, by which waste rock is built into dry walls along the drifts, thus saving timbering, while giving stronger walls than any timber could supply, and saving the cost of hoisting lean rock. The walling system of the Baltic has proven a success under actual test, and is now in general use in the Lake district, the credit being due Mr. Denton. A little melaconite is found in narrow fissures crossing the lode, these being too small to follow, but the black oxide ore mined in the stopes is saved in the milling, carrying 35 to 40% copper as dressed, and smelts readily with the native copper mineral. The native copper of the Baltic is arsenical, and it is probable that some copper arsenides are mined and milled, as narrow arsenical fissure veins occur occasionally in the district south of Portage lake. While the finished copper is arsenical, it makes wire of great tensile strength.

The shafts are numbered from south to north, with a distance of 3,025' between the extreme shafts, there being room for one additional shaft at the southern end. Mine makes about 2 miles of new openings yearly.

No. 1, the discovery shaft, located between Nos. 2 and 3, was sunk at a wrong angle, and was abandoned at depth of 219'.

No. 2, the southernmost shaft, is 2,257' deep, and began production 1906. The surface plant at No. 2 includes a boiler house with two 250-h. p. Stirling boilers, and an engine house with a Nordberg air compressor reducing 4,000' of free air per minute to a pressure of 70 lbs. per square inch, and a Nordberg hoist with double-conical drum. The shaft rock house has a crusher operated electrically, and the shaft has concrete stringers.

No. 3 shaft, 1,170' northeast of No. 2 and 2,526' deep, has a steel shaft rock house, built 1908, by the Wisconsin Bridge & Iron Co. This is of the circular type, with 1,200-ton bins, equipment including a 16x18" engine, two 18x24" Blake crushers and a large crusher operated electrically.

No. 4 shaft, 900' northeast of No. 3 and 2,457' deep, has a frame shaft rock house sheathed with steel, 36x71' with 17x31' wing, 88' high, with 1,400-ton rock bins and two 18x24" Blake crushers.

No. 5 shaft, the northernmost, 855' northeast of No. 4 and 1,624' deep, has a shaft rock house duplicating that at No. 4. Stoping is in progress on the 9th and 14th levels, inclusive, and drifts have been run to the Atlantic boundary. The ground was considerably disturbed in the upper levels, but is growing more settled at the bottom. Hoist is a duplex Nordberg, good for 1,500' depth. Shaft is to be abandoned and ground tributary thereto will be mined and hoisted through the No. 4 shaft.

Hand power cranes for handling mass copper have been installed at all shafts, and the mine has electric pumps.

The compressor house, between shafts Nos. 3 and 4, is 36x58' in size, with concrete foundations, stone walls and steel roof, housing a compressor with capacity to reduce 4,000 cu. ft., of free air per minute to a pressure of 70 lbs. per inch. Adjoining is a boiler house of similar material, 49x76', with wing 12x62', having four 250-h. p. Stirling boilers and a 140' self-supported steel smokestack. This boiler plant supplies steam for shafts 3 and 4. Adjoining the boiler house is a 360' coal trestle, of 5,000 tons capacity, un-

derneath being a 5x8' concrete tunnel, through which coal is hauled in tram cars, on a down grade, by endless cable. The mine has a complete electric light plant. A considerable town has grown up about the mine, with 100 well-built dwellings for employees, on lands owned by the company. The property is served by the Painesdale branch of the Copper Range railroad, under the same control as the mine.

The mill, on Lake Superior, one-half mile west of the Atlantic mill, went into commission Dec., 1901, and was enlarged, 1907. The building is of structural steel, on stone foundation, equipped with 4 Allis simple heads of 560 to 625 tons daily capacity each, and 2 Nordberg compound heads of about 800 tons daily capacity each, the second head having been completed June, 1908, giving the mill a capacity of about 4,000 tons daily. Stamp foundations are massive, with 90-lb. anvil plates set beneath the mortars. Finisher jigs and slime tables were displaced by Wilfley tables, and Woodbury jigs have been added, also Deister concentrating tables for treating the finer slimes, both giving good results. The mill has crushing rolls and a Huntington mill for regrinding, and a settling tank for slimes. Mineral carries about 60% fine copper, and tailing, 1907, carried 0.24% copper. The mill is heated by the Coogan & Strothenke system, air being delivered from 4 blowers, after previous heating by passing over steam coils, radiation in the coils being insured by a vacuum system. Power is furnished by a 500-h. p. 14x32" Nordberg cross-compound engine, and a 180-h. p. auxiliary engine.

The discharge at the mill is about 25' above mean lake level, and a drop of 1 in 10 provided for wasting many millions of tons of tailings by gravity, but the tailings accumulated largely in 10 years, and the management has planned the installation of a new system of dewatering, and carrying sands to the point of deposit by a belt conveyor, the water removed flowing out by gravity, and assisting in laying the sands at the point of deposit, clear water falling freely with a much smaller drop than sludge.

Adjoining the mill is a boiler house with five 250-h. p. Stirling boilers and a Green fuel economizer. Draft is secured by a set of duplex fans, driven by the mill engine, with a concrete smokestack 226' high and 8' in diameter. Behind the boiler house is a 25,000-ton coal storage yard, for the joint use of the Baltic and Atlantic mills, coal being brought to the boilers, through tunnels, by gravity. A 1,250-kw. electrical plant, installed, 1912, at the Baltic mill, supplies power for a number of regrinding mills at this and other stamp mills of the parent company.

Water for the Baltic and Atlantic mills is furnished by a \$150,000 gravity dam across the mouth of Salmon Trout river. The entire steel structure is anchored to a 2" steel base plate, at the bottom of the concrete, by a large number of 1½", 2" and 2½" steel rods, of 15 to 30' length. Water is taken from the dam about 20' below the crest by three 38" riveted steel pipes, one on the Atlantic and two on the Baltic side. There is a system of valves and waste weirs, but the structure is of such a nature that it could not be injured were water to flow continuously over its crest for an indefinite period. Surmounting this structure is a trestle of the Copper Range railroad, built at the same time, but in nowise a portion of the dam. The center of the railroad track is 7' above the crest of the dam, 10' down stream.

Rock hoisted, 1912, was 705,281 tons, with a discard of 52,848 tons, or 7.49%, the rock stamped, 652,433 tons, yielding 22,444,810 lbs. mineral, with an average return of 20.50 lbs. fine copper per ton, comparing with 22.06 lbs. per ton in 1911; 22.46 in 1910; 21.88 in 1909; 23.19 in 1908 and 21.94 in 1907.

Cost per ton, 1912, including taxes, was \$2.05, and cost of copper, delivered, including taxes, was 10.94 cts. per lb.

Recent production has been as follows: 14,384,684 lbs. fine copper in 1905; 14,397,557 lbs. in 1906; 16,708,868 lbs. in 1907; 17,724,854 lbs. in 1908; 17,817,836 lbs. in 1909; 17,549,762 lbs. in 1910; 15,370,449 lbs. in 1911; 13,373,961 lbs. in 1912.

The ultimate productive capacity of the mine cannot be predicted with safety, but the present milling capacity is equal to making nearly 25,000,000 lbs. fine copper yearly, and ultimately this output, or even a greater production, should be reached. The management is of the best.

BALTIMORE CONSOLIDATED MINING CO.

UTAH

Mine office: Eureka, Juab Co., Utah. Letters neither answered nor returned. Robt. A. Brown, pres.; C. C. Parker, vice-pres.; S. M. Simpson, sec.; John Enlund, treas. Organized Dec., 1908, under laws of Utah, capitalization \$100,000, shares 10 cts. par. Lands, just north of Big Hill, in the eastern section of the Tintic district, are being developed by shaft; 60' of tunnel driven in Dec., 1911.

BALTIMORE COPPER MINING CO.

MONTANA

Mine office: Amazon, Jefferson Co., Mont. John H. Mulligan, supt. No reply to letters. Described Vol. X. Owned Baltimore mine, Boomarang gulch, 4 miles from Boulder, having pyritic ore with sphalerite, silver-bearing galena and a little chalcopryrite. Was worked in small way in 1911 and 1912 by Chas. Whitcomb. See Bull. 527, U. S. Geol. Survey, p. 121, for description of mine.

BALTIMORE COPPER SM. & ROLLING CO.

MARYLAND

(Baltimore Copper Works), Fourth Ave. and Fifth St., Canton, Baltimore, Md. Jos. Clendenin, pres.; Wm. H. Peirce and Edw. Brush, vice-pres.; H. A. Thoman, sec.; Chas. N. Sappington, treas. Company succeeded the Baltimore & Cuba Smelting & Refining Co., which built the first American copper smelter, 1845, and is controlled, through stock ownership, by American Smelting & Refining Co. (American Smelters Securities Co.).

Lands, 30 acres, located on one of the best harbors of the Atlantic seaboard, with direct rail connections, being very advantageously located for both domestic and foreign business. The plant is large and modern, including a smelter, bluestone works, electrolytic plant, bullion refinery and sheet copper rolling mill. The electrolytic refinery, of 500 tons daily capacity, has anodes arranged on the series plan. Material treated is entirely auriferous and argentiferous, being received in the form of blister copper from various western states, and from several foreign countries. Works employ about 1,000 men.

BAMAR COPPER CO.

MONTANA

Mine office: 410 State Savings Bank Bldg., Butte, Mont. M. J. Scott, pres.; F. H. Butler, vice-pres.; J. B. Frisbee, sec.; M. A. R. Scott, treas. Organized Sept. 24, 1910, under laws of Montana, capitalization \$1,500,000, shares \$1 par, nonassessable. Annual meeting, first Tuesday in June.

Lands, 12 claims, area 230 acres, in the Summit Mountain district, near Buxton Switch, in the foothills of Fleecer mountain, 13 miles southwest of Butte. Claims were bought of Butte & Buxton Copper Mining Co. for 150,000 shares of Bamar stock. Lands carry several veins, of which 1, of 50' estimated average width, opened on surface for 6,000', was mined 1890, by several shallow shafts, for silver-lead ores. Country rock is granite, markedly similar to that at Butte, covered by 1 to 8' of wash, with a mineralized zone of about one-half mile width carrying 4 veins, with a diorite

dike to the northward. Shallow pits and trenches show continuity of the veins, which are leached at surface, carrying a little carbonate ore below commercial tenor.

Development includes several shallow old shafts, and the 180' two-compartment Linda shaft, also the 700' Linda tunnel, with a total of about 1,000' of workings. The tunnel shows a ledge, carrying a mineralized 10' streak along the footwall showing mainly pyrite, with some argentiferous chalcopyrite and occasional carbonate stains, and a highly silicious gangue. Property has yielded ore carrying 1 to 36% copper and 43 oz. silver per ton, with up to \$2.50 gold, also galena assaying 11% lead, 24 oz. silver and \$1 gold per ton.

Equipment includes a 40-h. p. boiler, 20-h. p. hoist good for 500', 2-drill air compressor and several mine buildings. Company plans deepening shaft, drifting and crosscutting. Property considered promising.

BANKERS' MINING & DEVELOPMENT CO.

MEXICO

Office: 310 Hayden Bldg., Columbus, Ohio, and 35 Nassau St., New York. Organized under laws of Arizona, capitalization \$5,000,000 in \$1,-000,000 non-cumulative 7% preferred stock and \$4,000,000 common stock. Reorganized with same capitalization Jan., 1910, under laws of Delaware by Wm. B. Reed and Casper H. Eicks, both deceased; Chas. Q. Davis, pres.; P. W. Luper and H. C. Garber, directors.

Property owned by company, consisting of various copper mines in Magistral district, San Juan, State of Puebla, Mexico, together with coal and timber lands, were sold to the Puebla Smelting & Refining Co., Nov., 1912, for \$1,000,000 convertible debenture bonds and \$3,000,000 stock of that company. Is now merely a holding company.

BANNACK CONSOLIDATED MINING CO.

MONTANA

Idle. Office: 104 Granite St., Butte, Silver Bow Co., Mont. Mine near Bannack, Beaverhead Co., Mont. Carl H. Hand, pres. Organized 1906, capitalization \$1,250,000, shares \$5 par. Lands, 312 acres, covered with alluvium of 25 to 75' depth, opened by 2 shallow shafts, showing ores assaying up to 5% copper and \$2.40 gold per ton.

BANNER COPPER CO.

ARIZONA

Letter unclaimed at Globe, Gila Co., Ariz. Organized May, 1907, under laws of Arizona, capitalization \$1,000,000, by W. D. Connell, J. B. Aiken and Spencer Jewell, practically as successor of the Arizona Banner Copper Co., which was a reorganization of the Pinal Copper Co. See Vol. VII.

B. A. & P. GROUP.

MONTANA

Situated west of Saltese, Missoula Co., Mont. Operated by Hall, Lusk & Co. Property, 14 claims, developed by 500' tunnel, planned to be driven to 800', reported to show sulphides carrying copper, silver and lead in the vein-filling.

BARABA MINING CO.

WISCONSIN

Idle. Office and mine: Mellen, Ashland Co., Wis. Nelson Baraba, Sr., pres.; Nelson Baraba, Jr., sec. Organized 1906, capitalization \$1,000,000, shares \$1 par. Has a shallow shaft showing ore assaying 2.8% copper, with traces of gold and silver.

BARE HILL MINE.

MARYLAND

Office: care of F. R. Van Antwerp, owner, Hornell, N. Y. Mine near Mt. Washington, Baltimore Co., Md. Is an old and slightly developed mine, showing auriferous and argentiferous chalcopyrite and bornite. Idle many years.

BARNES COPPER CO.

MONTANA

Office: 91 Dearborn St., Chicago. Mine office: Philipsburg, Granite Co., Mont. G. G. Parry, pres.; Herman O. Brunder, vice-pres.; John C.

Thurston, sec.; preceding officers, Frank G. Wilson, Frank E. Barnes and G. H. Savage, directors. Organized under laws of Arizona, capitalization \$1,500,000, shares \$1 par. Lands, 5 claims, unpatented, on Gird creek, 4 miles from Northern Pacific railway, said to show a vein of 4' average width, between diorite and slate, carrying copper ore, and 2 veins, of about 6' width, between quartzite and sandstone, carrying silver-lead ores, former developed by a 120' tunnel and latter by a 110' shaft between the silver-lead veins. No recent returns secured.

BARNEY CANYON MINING CO.

UTAH

Idle. Mine near Bingham Canyon, Salt Lake Co., Utah. Frank W. Klett, pres.; Valentine Williams, vice-pres.; H. Percy Bourne, sec. and treas.; preceding officers, Geo. Ewing and M. C. Godbe, directors; Chas. Gillen, supt., at last accounts. Organized June, 1909, under laws of Utah, capitalization \$100,000, shares 10 cts. par, assessable. Lands, 13 claims, in the northern part of the Bingham district, having several open cuts, a short tunnel and 2 shallow shafts, one said to show a vein of 40' width, apparently carrying about 2' of disseminated copper carbonates on the footwall, at depth of 23'. Closed down several years.

BARNEY COPPER CO.

ARIZONA

Office and mine: Globe, Gila Co., Ariz. Hon. J. D. Coplen, pres. and gen. mgr.; J. B. Coplen, vice-pres.; W. J. Miller, sec.-treas.; J. E. Miner, supt. Foregoing with F. F. Green and J. N. Porter directors. Organized Aug. 27, 1910, under laws of Arizona, capitalization \$5,000,000, shares \$5 par, nonassessable; fully paid and fully issued, 999,995 shares being given for property. Annual meeting, first Tuesday in October.

Lands, 26 claims, partly fractional, unpatented, area 450 acres, west of the Live Oak and Keystone mines, showing Pinal schist and quartzite, partially covered by conglomerate. Property has a number of old pits and shafts, deepest 400', in Gila conglomerate. Equipment includes a 15-h. p. gasoline hoist, and there are 7 camp buildings.

In April, 1911, Barney stock was offered for sale in Kansas City at 50 cts. per share. In Jan., 1912, an option on property was given to the General Development Co. for \$600,000. This company put down 3 holes, one at the bottom of the 400' shaft passed out of schist and into dacite and at 1,030' into granite porphyry. Three drill holes 1,450', 600' and 1,015' deep, failing to disclose any ore, the option was relinquished in July, 1912. The No. 1 drill hole encountered an artesian flow at 960', which is a valuable asset of the company. The surface conditions on property are unpromising, the rocks gray and unaltered and this area is not favorably regarded.

BARRANCA COPPER CO.

MEXICO

Office: 170 Broadway, New York. Mine office: Barranca del Cobre, San Andres del Rio, Chihuahua, Mex. H. T. R. Cowell, the former manager, resigned, 1908. Lands, in the Urique district, 35 miles east of Creel railroad station, include La Purisima mine, having argentiferous and auriferous copper ores, developed by 750' shaft and 2,100' tunnel, said to show large reserves of low-grade copper ore. Equipment includes a 20-stamp mill with two 4' Huntington mills, a 100-ton concentrator and a 60-ton smelter. Production yearly is about 2,000 tons of high-grade ore and concentrates, shipped to the Aguascalientes smelter. Property was under lease, 1910, to Mendoza & Nesbitt, and negotiations for its purchase by an English syndicate were in progress when stopped by the revolution.

BARSTOW MINE.

COLORADO

Office: 42 Broadway, New York. Mine office: Ouray, Ouray Co., Colo. Works at Ironton, Ouray Co., Colo. J. H. Fennessy, trustee, New York

office; A. R. Wilfley, cons. eng.; C. R. Wilfley, mgr., at Denver; O. W. Knous, supt.; A. C. Haskell, mill supt.; W. C. Fulton, purch. agt. Property, 27 claims, patented, 199 acres mineral land with 5 acres mill site, in Red Mountain district. Ore found in fissure vein in andesite with northwest strike and dipping 75°, is reported as 8' wide and carries 0.75% copper, 2.5% lead, 4% zinc. Developed by 2 shafts, 425' and 145' deep and 2 tunnels, 3,200' and 3,300' long. Total length of underground workings 10,300', reported to have developed 17,000 tons of ore with 8,000 tons in sight.

Property closed down in 1906 and reopened 1910 on discovery of new orebody. Equipped with 2 hoists, electric compressor, 6-drill capacity, frame stamp mill and concentrator with 2 Blake crushers, 9x15", 40 stamps, 20 Wilfley tables, 2 slime tables and buddles. Mine has 115 h. p., mill 175 h. p.

Mine is 11 miles from D. & R. G. R. R. and the Silverton R. R., operating in the summer, is 1 mile away.

Production, 1912, was 11,301 tons, yielding 34,049 lbs. copper. Estimated production 1913, 45,000 lbs. copper. Company plans extensive development and installation of electric hoist, saw mill, etc. Mill in operation from June 1 to Dec. 1 only.

BARSTOW MINING CO.

UTAH

Office: 34 South First West St., Salt Lake City, Utah. Letter unclaimed at mine address, Bingham Canyon, Salt Lake Co., Utah. Henry Newell, pres.; W. L. Pickard, Sr., vice-pres.; Grace C. Glanfield, sec.-treas. Organized Feb., 1910, under laws of Utah, capitalization \$10,000, shares 2 cts. par. Lands, 1 claim. No trace of operations secured.

BARTOLINI HERMANOS.

MEXICO

Mine office: Estacion Izabal, Arizpe, Sonora, Mex. M. C. Bartolini, mgr., at last accounts. Ore carries copper, silver and gold, with values mainly in silver, sometimes up to net returns of \$2,000 to \$4,000 per car. Was shipping 4 carloads of ore monthly, employing about 40 men some years ago and has been intermittently active recently.

BASIN REDUCTION CO.

MONTANA

Basin, Jefferson Co., Mont. Company was controlled, through stock ownership, by La France Copper Co., which, in turn, is controlled by United Copper Co. Company succeeded the Basin & Bay State Mining Co., Aug., 1907, buying the mill and smelter, also the Katie mine, at sheriff's sale, for \$302,865. Mill is of about 1,200 tons daily capacity. State Savings Bank of Butte held judgment for a debt of \$158,920, paid by F. A. Heinze interests and property held (Jan., 1912) by Geo. E. Shaw and F. E. O. Potts, trustees. Property belongs to Atlantic Mines Co. by purchase of entire holdings of La France Copper Co., which held this plant.

BASLER MINING & DEVELOPMENT CO.

CALIFORNIA

Letters to 904 J St., Sacramento, Cal., unanswered. Mine office: Lowry, Tehama Co., Cal. Dr. D. L. McLean, pres.; W. L. Rennie, sec.-treas.; C. M. Basler, gen. mgr., at last accounts. Organized under laws of California, capitalization \$200,000, shares \$1 par. Lands, 14 claims, partly patented, also a 5-acre mill site and 320 acres miscellaneous lands, opened by a 1,200' tunnel, with 3,000' of underground workings, showing 3 orebodies, one, of 2 to 75' width, giving average assays of 2% copper, 2% lead, and \$1 to \$3 gold per ton, from malachite, bornite and chalcopryrite.

BATTLESHIP MINING & MILLING CO.

NEW MEXICO

Idle many years. Office: 412 Mack Bldg., Denver, Colo. Mine near Lordsburg, Grant Co., N. M. Dr. O. L. Blachly, pres.; O. B. Crum, sec.-treas. Capitalization \$100,000, shares \$1 par. Lands, 2 groups of 2 claims each, area 79 acres, in the Virginia district, 3 to 4 miles from Lordsburg,

connected therewith by a good wagon road. Property has no surface improvement, but is opened by 475' of shafts, crosscuts and open cuts, showing ores that are said to have given average returns, from smelter shipments to El Paso, of 8 to 14% copper, 1 to 20% lead, 22 oz. silver, and \$10 to \$20 gold per ton.

BAUMANN MINES CO.

ARIZONA

Office: Prescott, Ariz. Mine office: Humboldt, Yavapai Co., Ariz. Jules Baumann, pres. and gen. mgr.; E. S. Clark, vice-pres.; J. E. Russel, sec.; Allen Hill, treas., preceding officers and Robt. E. Morrison, directors. Organized March 18, 1910, under laws of Arizona, capitalization \$3,000,000, shares \$10 par, nonassessable; issued, \$650,000. Annual meeting, first Monday in March. Practically was successor to Baumann Copper Co., which forfeited bond and lease to Jules Baumann, Feb., 1909, and property was bid in at sheriff's sale. Mine examined, March, 1913, by F. A. Golden, and property is to be reopened.

Lands, unpatented, 25 claims, 500 acres, 2 miles east of Humboldt, in the Agua Fria district, carrying fissure veins in quartz, schist and porphyry, and a contact deposit between porphyry and schist having a heavy gouge on the footwall. Ores are oxidized in the upper workings, succeeded by chalcopryrite, ore being said to give assays up to 67% copper, from a trace to 300 oz. silver, and up to \$35.50 gold per ton.

The Swiss Girl mine, opened 1884, has 8 shafts, of 30', 26', 65', 40', 67', 208', 320' and 900' with a 250' crosscut tunnel and a 305' drift tunnel. Only assessment work is now being done on this group.

The Baby mine, 1,000' northeast of the Swiss Girl, has a 130' shaft, showing azurite, malachite and chalcocite.

Equipment includes a 200-h. p. steam plant, with 2 hoists and a 2-drill Sullivan air compressor. Buildings are a smithy, power house, office, bunk house, boarding house and several dwellings. Work was resumed Nov., 1910, and management plans deepening the Baby shaft and crosscutting at 100' intervals. Like other properties in this district, ore is low-grade and difficult to concentrate but will some day be profitably mined.

B. & B. MINE.

MONTANA

Situated in Powell Co., Mont. J. P. Brusezite, owner. Property has been taken over by the Issuing Syndicate, G. T. Brown, mgr. Developed by 400' tunnel said to expose a well-defined orebody carrying copper and gold values.

BEACON CONS. MINES CO.

COLORADO & MEXICO

Idle. Described Vol. X. Letters unclaimed, 1913, at Denver, Colo., and Cananea, Sonora, Mex.

BEAD LAKE GOLD-COPPER MINING CO.

WASHINGTON

Office: 600 Columbia Bldg., Spokane, Wash. Mine near Newport, Stevens Co., Wash. Geo. C. Geisler, pres.; W. E. Allen, sec.-treas. and gen. mgr.; preceding officers, Geo. Potter and A. M. Harris, directors. Organized Dec. 15, 1910, under laws of Washington, capitalization \$3,000,000, shares \$1 par, assessable. Annual meeting, first Tuesday in March.

Property, 13 claims, 267 acres, about 2 miles from Conquest landing on the Pend d'Oreille river, showing 3 veins in diorite 2 to 40' wide. Two veins developed by a 3,000' tunnel and 3 shallow shafts, deepest 90', said to carry copper-lead-silver sulphides; 200 tons ore developed according to management. Mine has a fair equipment, including steam power and an air compressor. Company plans driving tunnel 250' further.

Company bought controlling interest in Comstock mine and adjoining claims, 8 miles from Newport, in Feb., 1913, for \$25,000 cash and an interest in the company.

BEAR GULCH MINING CO.**MONTANA**

Idle. Office and mine: Twin Bridges, Madison Co., Mont. Alex. Johnson, mgr.; Edson C. Baxter, supt., at last accounts. Property is the Mountain View group, carrying auriferous and argentiferous copper ores, opened by tunnel. Has steam power.

BEAR MOUNTAIN MINING & DEV. CO.**WASHINGTON**

Probably dead. Mine office: Colville, Stevens Co., Wash. C. G. Caruthers, supt., at last accounts. Has argentiferous and auriferous copper ore, opened by tunnel.

BEAR MOUNTAIN TUNNEL & MINING CO.**COLORADO**

Mine office: Crystal, Gunnison Co., Colo. H. H. Williams, supt., at last accounts. Lands, 26 claims, patented, having 300' and 400' tunnels, showing argentiferous and slightly auriferous copper ore. Has water power. Out of funds, idle since 1907, and probably dead.

BEAR TOOTH GOLD & COPPER MINES CO.**CALIFORNIA**

Office and mine: Quimby, Trinity Co., Cal. Frank P. Burris, pres. Organized Oct., 1907, under laws of California, capitalization \$900,000. Lands, 14 claims, including 8 claims on the east side of New river, reported to carry 14 parallel veins from a few inches to several feet in width, 1 vein, of about 4' width, being said to give average assays of 4% copper, 5 oz. silver and \$15 gold per ton. Upper portions of the vein under development are oxidized, carrying copper carbonates and considerable chalcantite associated with hematite, succeeded by chalcopyrite associated with arsenical pyrite and manganese, with quartz gangue. Vein opened has a gabbro foot and serpentine hanging walls. Development includes a shallow shaft and 3 tunnels, No. 1 of 110', No. 2, which is about 300' lower, of 125', and No. 3, 100' lower than No. 2, of 120'. Equipment includes an 8' Huntington mill, which was treating ore for gold values, at last accounts.

BEATSON COPPER CO.**ALASKA**

Office: 165 Broadway, New York. Mine office: Latouche, Latouche island, Alaska. Stephen Birch, pres.; E. S. Pegram, vice-pres.; C. T. Ulrich, sec.; E. S. Pegram, treas.; preceding officers, Wm. Pierson Hamilton, John N. Steele, Sam'l J. Clark and A. K. Beatson, directors; F. R. Van Campen, supt.; J. K. MacGowan, purch. agt. Company incorporated June, 1910, under laws of Nevada, capitalization \$3,000,000, shares \$5 par, fully paid, nonassessable; fully issued. Lincoln Trust Co., New York, N. Y., registrar. Annual meeting, October. Company is controlled, through stock ownership, by the Guggenheim interests.

Lands, 20 claims, patented, area 340 acres, known as the Bonanza mine, about 3 miles from the northern end of Latouche island, within one-half mile of tide-water, where there is a good natural harbor. Country rock is slate, and ore is chalcopyrite, occurring in brecciated portions of the country rock. The orebody is a large lens whose limits are as yet unknown. Ore assays up to 30%, and as shipped, has returned 7 to 8% copper, and 2 oz. silver per ton. Mine was located, July 4, 1897, by Andrew K. Beatson, and began shipping, 1903. Development is by a big quarry and tunnels of 320' and 900', with one underground level from which raises and stopes have been made to surface. Property has rooming, mess and change houses, and a hospital with physician in charge.

A half-mile tram line, of 24" gauge, leads to a 300' wharf, with ore bunkers, on the natural harbor. Freight to Tacoma, by water, is \$2.75 per ton, and ore being desirable for flux is smelted at an average cost of about \$1.65 per ton. Buildings include an office and store. Employs about 90 men. The mine has been a continuous and increasing shipper, since 1903, production being about 1,020,000 lbs. fine copper and 9,000 oz. silver

in 1907, and 5,192 tons of ore, yielding 1,264,053 lbs. fine copper and 8,820 oz. silver in 1909. Produced between 3,000 and 4,000 tons of ore monthly in 1912. Mine is located on water front and ships ore direct by steamer to the Tacoma Smelter, Tacoma, Wash. Property considered valuable and management good.

BEAVER-BUTTE COPPER CO.

UTAH

Probably idle. Office and mine: Beaver, Beaver Co., Utah. John M. Murdock, pres.; Albert F. Fillerup, vice-pres. and cons. engr.; John D. Pritchett, mine mgr., at last accounts.; O. F. McChane, sec.; preceding officers and John E. Pritchett, directors. Organized May, 1909, under laws of Utah, capitalization \$50,000, shares 10 cts. par, assessable.

Lands, 5 claims, unpatented, in the Newton district, 8 miles from a railroad, showing copper ore, developed by a 175' two-compartment shaft.

BEAVER CONSOLIDATED MINING CO.

UTAH

At Milford, Beaver Co., Utah. M. G. Cuver, mgr. A new 55-ton mill was erected Jan., 1912, and 138 men employed. Main shaft is 510' deep with lowest level at 460'. Company worked 11 air drills, Feb., 1912.

BEAVER COPPER CO.

UTAH

Office: 222 D. F. Walker Bldg., Salt Lake City, Utah. Mine at Milford, Beaver Co., Utah. A. D. Moffat, pres.; A. J. McMullen, vice-pres. and gen. mgr.; A. D. McMullen, sec.-treas.; preceding officers, H. P. Clarke, Chas. A. Weaver and Jas. H. Paterson, directors; D. P. Röhlfing, cons. engr. Organized 1907, under laws of Utah, capitalization \$1,000,000, shares \$1 par, assessable; issued, \$617,000. Annual meeting, third Monday in March.

Lands, 8 claims, area 160 acres, in the Beaver Lake district, carrying an ore zone for about 6,000', with 2 veins, known as North and South, that are fissures in limestone. One vein, developed by 4 pits and a 140' shaft, with 308' of workings, estimated to show 375,000 tons of ore, which is excessive, shows oxidized and sulphide ores, latter chalcopyrite, estimated by management to average 3% copper, 14 oz. silver and \$2.50 gold per ton, in a vein estimated by management to be 100' wide. A carload of surface ore, sent as a smelter test, returned 7.5% copper, 6 oz. silver and 80 cts. gold per ton. Idle some years, except for annual assessment work, as open-cut work on veins.

BEAVER-HARRISON MINING CO.

UTAH

Idle. Office: 23 Eagle Block, Salt Lake City, Utah. Mine office: Milford, Beaver Co., Utah. J. J. Trenam, pres. and mgr.; E. H. Jacobs, treas.; B. L. Corum, sec. Organized 1904, capitalization \$75,000, shares 5 cts. par, as a merger of Beaver Consolidated Mining Co. and Ben Harrison Gold & Copper Mining & Milling Co.

Lands, 21 claims, 385 acres, in the Beaver Lake district, one group being near the O. K. mine of the Majestic company, carrying sundry fissure veins, opened by 2 shafts of 300' and 534', with about 2,000' of workings, showing a 10' orebody assaying 5 to 50% copper, and up to 10 oz. silver, and \$7 gold per ton. Has steam power and an air compressor, with necessary mine buildings.

BEAVER MINES CO.

UTAH

Office: 603 Utah Savings & Trust Co., Salt Lake City, Utah. Mine address: Marysville, Piute Co., Utah. A. H. Cutright, pres., treas. and mgr.; W. E. Kilburn, vice-pres.; Donald McMillan, sec., and W. J. Woodhead, directors. Organized Dec. 17, 1910, under laws of Utah, capitalization \$1,000,000, shares 1 ct. each; issued, \$25,000. Annual meeting, second Saturday in January.

Property, 20 claims, 320 acres, in the Ohio district, 5 miles from D. & R. G. R. R. Also owns 50 acres mill site and timber land. Claims carry

copper-bearing gold-silver ores in fissure veins in andesitic porphyry. There are 7 veins, 2 developed by crosscut tunnels, 400' and 72' long, to reach the main vein. Mine has only a prospecting outfit.

BEAVER MOUNTAIN MINING CO.

ALASKA

Idle. Mine office: Sulzer, Prince of Wales island, Alaska. Henry Miller, pres.; George Comer, mgr., at last accounts. Lands are on the southern side of Beaver mountain, Hetta inlet. Development is by tunnels, showing ore carrying copper, nickel and cobalt. Operations confined to annual assessment work.

BEAVER TRI-METALLIC MINING CO.

UTAH

Idle. Office: 35 West Second South St., Salt Lake City, Utah. Letter unclaimed at Milford, Beaver Co., Utah. L. H. Goulet, pres.; F. J. Nichols, vice-pres.; Geo. D. Anson, sec.; W. F. Earls, treas. Organized Jan. 12, 1910, under laws of Utah, capitalization \$100,000, shares 10 cts. par. No trace of operations secured.

BECKER & KUHLMANN.

MEXICO

Mine office: Asientos, Ocampo, Aguascalientes, Mex. Enrique Becker, supt., at last accounts. Lands, 40 hectares, including El Tepozan, San Segundo and El Triunio mines, developed by a 40-meter incline shaft, producing auriferous and argentiferous copper ores. Planned installing gasoline hoists and employed about 20 men, 1910. Presumably idle.

BEEMER CONSOLIDATED GOLD & COPPER CO.

ARIZONA

Owens the Stormcloud mine at Mt. Union, 12 miles south of Prescott, Yavapai Co., Ariz. Idle, 1912.

BELCHER MINING CO.

WASHINGTON

Mine office: Republic, Ferry Co., Wash. Jos. A. Anderson, pres. and mgr. Mine has 3 tunnels, the 1,000' No. 3 main tunnel showing a considerable body of auriferous and argentiferous chalcopryrite, of fair average grade. A 1,000' aerial tram connects the tunnels with ore bins on the railroad. Water, brought 2,000' from Lambert creek, through a steel pipe, generates electric power, supplemented by a gasoline auxiliary plant. Equipment includes an air compressor and power drills.

Property, reopened May, 1911, and shipped ore to Granby smelter. A large tonnage of low-grade gold-bearing pyritic copper ore was developed on the 300' level. Mine reported, 1913, to have opened up lenses of low-grade ore on the 1,400' level.

BELÉN MINING CO.

MEXICO

Mine at Cumpas, Sonora, Mex. Idle since examination made by Horace V. Winchell about 1910. Mine considered of slight value, orebody being worked out. Fully described Vol. X.

BELÉNE COPPER CO.

MEXICO

Letters returned unclaimed from Carbo, Sonora, Mex., and former Los Angeles office. Property at Copete, Ures, Sonora. See Vol. X.

BELL-DOMINION COPPER MINING CO.

ARIZONA

J. F. Hechtman, pres., writes, 1913, that company has no property and is out of business at present. See Vol. X. Formerly at Globe, Gila Co., Ariz.

BELL MINE.

COLORADO

Wm. Bell and associates, owners, Lyons, Boulder Co., Colo. Property, near Lyons, shows orebodies 3 to 5' wide developed by shaft. Equipment includes compressor, pumps, etc. Shaft being deepened, 1913.

BELLAVISTA; MINA.

MEXICO

Idle. Office: care Henry L. Choistry, owner, Guadalajara, Jal., Mex. Lands, 14 hectares, just east of Etzatlan, Ahualulco, Jalisco, Mex., having 7 veins, 2 averaging 1 meter in width, slightly developed by about 95

meters of workings, showing argentiferous and auriferous copper ores. Property is an antigua, formerly known as the Picachos.

BELLE SPRINGS GROUP.

ARIZONA

Office: Superior, Pinal Co., Ariz. Jack McKinnon, owner. Group comprises 16 claims, near Calumet-Arizona holdings. Development by crosscut tunnel-168' long to reach main vein, whose outcrop is said to be 14' wide. A 4' ledge is cut in tunnel and is reported to show 3% copper, \$3.80 gold and 10 oz. of silver per ton.

BELMONT-BANNER MINING CO.

IDAHO

Office: Eagle Block, Spokane, Wash. Mine at Delta, Shoshone Co., Idaho. I. Waldo Murphy, pres.; J. H. Masks, sec., and D. W. Jackson, directors. Capitalization \$1,000,000. shares \$1 par. Property, 3 claims, 1 fractional, near Delta, showing a fissure vein of 3' to 4' surface width, in quartzite, carrying silver, lead and copper values. Mine has about 700' underground workings. Company doing annual assessment work only.

BELMONT MINING CO., LTD.

IDAHO

Office: Wallace, Shoshone Co., Idaho. Mine in Two Mile gulch, Evolution district, 2 miles from Osborne. Organized 1900, capitalization \$100,000, shares 10 cts. par. with 200,000 shares in treasury. Reorganized 1909, 1,000,000 shares at \$1.00 par, assessable; placing 500,000 shares in treasury. William Sheave, pres.; D. C. Nicholson, vice-pres.; Frank P. Hess, sec-treas., with Ida Sheave, Crist Anderson, S. R. Moore and John Michels as additional directors (May, 1913).

Property, 9 full claims showing 2 ledges. North ledge has tunnel 45' long and open cuts, south ledge has open cuts and 50' shaft; 617' crosscut tunnel driven on contact shows quartz stringers with siderite, galena and copper ore; 190' crosscut work in tunnel. Claims are in a silver-lead district and copper values incidental. Is a development proposition only.

BEN HUR LEASING CO.

WASHINGTON

Mine office: Republic, Ferry Co., Wash. Dr. C. M. Kingston, pres. and mgr., Grand Forks, B. C.; John Benson, supt. Property, the Little King and Queen claims on Gold hill, developed by 800' shaft, showing gold, silver and copper ore. Equipped with steam power, compressor, etc. New plant installed 1913. Property was intermittently worked, 1911-12 and drifting done on the 200' and 400' levels. Shipping about 900 tons weekly, 1913. Mine was under examination, Aug., 1913.

BEN HUR MINING CO.

MONTANA

Address: Saltese Supply Co., Saltese, Missoula Co., Mont. D. S. Dickson, pres.; Frank H. Bell, vice-pres. and purch. agt.; Chas. J. Luedke, sec.; C. A. Keating, treas.; preceding officers, Peter Peterson and A. J. Matthiesen, directors. Capitalization \$1,500,000, shares \$1 par. Annual meeting, last Saturday in April.

Lands, 5 claims, adjoining the Last Chance mine, 3 miles from a railroad, showing a fissure vein, in quartzite, of 10 to 60' width at surface. Development is by 2 crosscut tunnels, the lower, of 865', cutting a vein carrying silver-lead and gray copper ores, giving assays up to 51% lead and 130 oz. silver per ton. Property considered a promising prospect.

BEN HUR MINING & MILLING CO.

WASHINGTON

Is a reorganization of the Ben Hur Gold Mining Co. Property leased to Ben Hur Leasing Co., 1912. See Vol. X.

BENNETT-STEPHENSON M. & M. CO.

NEW MEXICO

Succeeded, 1912, by Organ Mountain Mining Co., which see. Fully described Vol. X.

BENT MINE.

NEW MEXICO

Idle. Mine at Orogrande, Otero Co., N. M. Lands, on Tularosa creek,

5 miles below the Mescalero Indian Reservation, have been worked some years, with small ore shipments to El Paso smelter. Equipment includes a small concentrator, planned to be enlarged. Property considered promising.

BERGESON MINING CO.

WASHINGTON

Mine office: Berlin, King Co., Wash. Lars Larson, supt., at last accounts. Property shows copper ore carrying gold and silver values. Developed by shaft, equipped with gasoline hoist.

BERNOUDY-TURKEY CREEK CO.

ARIZONA

Probably dead. Former office: Paradise, Cochise Co., Ariz. * Described Vol. X.

BERTHA MINE.

MONTANA

Owned by Boston & Corbin Copper & Silver Mining Co., at Corbin, Jefferson Co., Mont.

BERTONELLI LEASING CO.

COLORADO

Leadville, Lake Co., Colo. Property, a lease on Little Jonny shaft No. 4. Producing high-grade silver-copper ore from large ore shoot in July, 1913.

BESSEMER COPPER MINES CO.

NEW MEXICO

Mine office: Fierro, Grant Co., N. M. Lands include the Continental, Iron Head and Anson S. mines, latter said to produce ore of 7% copper tenor, opened by a 200' shaft. Property was worked formerly for iron ore, having been leased by the Bessemer Iron Association and Colorado Fuel & Iron Co. Extraction of copper by latter was stopped, by injunction, lease calling for mining of iron ore only. Idle several years.

BESSEMER GOLD & COPPER MINING CO.

NEW MEXICO

Office: Deming, Luna Co., N. M. F. C. Peterson, pres.; N. J. Grunwald, vice-pres.; N. E. Baxter, sec.; C. Baker, treas.; W. S. Reese, mgr. Company organized about June, 1912, in New Mexico, capitalization \$500,000, shares \$1 par. Property includes Washington (Ruebush and Tidmore) group of 6 claims on the west side of the Florida district, near the Stenson Raithel mines, also the Hachita group in Eureka district, near Hachita, N. M., 8 miles from E. P. & S. W. R. R.

BESSEMER IRON ASSOCIATION.

NEW MEXICO

Idle some years. Office: Hanover, Grant Co., N. M. Mine office: Fierro, Grant Co., N. M. Copper properties were leased to Bessemer Copper Mines Co., at last accounts.

BEST CHANCE MINING CO., LTD.

IDAHO

Main office: 203 Paulsen Bldg., Spokane, Wash. Mine office: Wallace, Shoshone Co., Idaho. Chas. H. Bell, pres.; W. A. Cox, vice-pres.; Chas. A. Gram, sec.-treas.; Robert J. Edgren, mgr. and purch. agt. Other directors, W. D. Marshall and Chas. Harr. Organized March, 1909, under laws of Idaho. Capitalization \$1,500,000, shares \$1 par, fully paid and assessable. Fissure veins said to be 100' wide in Burke quartzite with 1,560' of underground work. Crosscut tunnel being driven to cut ore. Is primarily a silver-lead property.

BEST FRIEND GROUP.

ARIZONA

P. O.: Kirkland, Yavapai Co., Ariz. Property, 9 claims in Weaver district, 9 miles southwest of Kirkland, showing 40' vein of low-grade copper ore and developed by a shaft 150' deep, with crosscut. Ore said to carry 2 to 8% copper.

BETTY ALDEN MINING CO.

MONTANA

Main office: Oliver Bldg., 141 Milk St., Boston, Mass. Mine office: Basin, Mont. P. F. Ward, pres.; Thos. C. Kelly, sec.-treas., and Thos. F. Fitzgerald, directors. Organized about April, 1913, under laws of Arizona, capitalization \$4,500,000, shares \$15 par. Succeeds the Montana Mineral

Land Development Co., and apparently has taken over its Montana holdings.

Lands, 19 claims, area 300 acres, known as the Eva May and Red Bird group, on Cataract creek, showing fissure veins in granite carrying sulphide ores, mainly chalcopryrite. Mine has a 1,200' vertical shaft and tunnels of 525', 1,400' and 800', developing a vein of 100' claimed width, giving assays of 6% copper, 6 to 12% lead, 15 to 30 oz. silver and 20 cts. to \$3 gold per ton. The property shows a considerable body of low to medium grade ore, and the management estimates 50,000 tons blocked out for stoping, which probably is an overestimate.

Equipment includes a 200-h. p. steam hoist having two 75-h. p. hoists, one being a 14x16" Vulcan hoist raising single-deck cages, and a 4-drill Ingersoll-Sergeant air compressor. Buildings include a 20x40' log machine shop, 20x30' smithy, 24x34' carpenter shop, and a 30x80' power house. The concentrator, of logs, is 35x120', with a 7x10" Blake crusher, 1 set of rolls, 8 three-compartment jigs and 2 Wilfley tables. The property produced 7,000 tons of ore, sold for \$166,238 about 1909.

The new company plans unwatering the mine, finishing a tunnel now almost completed to cut the orebody and shipping ore from the King's claim. Editor is familiar with the property and considers it can be profitably worked if railroad were built to the mine. The King tunnel, which was driven to hold some unpatented claims, is drifted along a tourmalinic vein 2½ to 3' wide, carrying pyrite, arseno-pyrite, sphalerite and galena. The ore of the Eva May mine is a coarse, white quartz carrying pyrite, chalcopryrite, galena, sphalerite and gray copper with much black tourmaline. The latter caused trouble in concentration work.

BETUNE MINE.

NEVADA

Property situated in the Funeral range of Nevada, about 60 miles southwest of Beatty, Nye Co., Nev. Judge Betune, owner. There are 10 claims with good surface showing of high-grade carbonate ore.

BEZANT GOLD MINING CO.

COLORADO

O. J. Duffield, supt., Central City, Gilpin Co., Colo. Property has a quartz vein carrying gold ore with copper sulphides developed by a 500' shaft, electrically equipped. Operated intermittently.

BIBIANA; MINA.

MEXICO

Office and mine: Charcas, Moctezuma, San Luis Potosi, Mex. Aurelio Hiriarte, owner and mgr., at last accounts. Mine is a small producer of silver-copper ores.

BIG BLUE MINING CO.

ARIZONA

Mine, Black Rock district, 14 miles from Wickenburg, Yavapai Co., Ariz. Col. Brown, mgr., at last accounts: J. A. Caskey, supt. Owns the Big Blue and Copper Prince mines on the Hassayampa river, showing fissure veins in schist, that yield high-grade gold-copper ore.

Development by 2 shafts, connected on 200' level, 1 shaft having been sunk in 1913. An ore shoot developed on 100' and 200' level is now being stoped.

Equipment includes new hoisting plant and a concentration mill. Shipping regularly to Douglas in 1913.

BIG BUTTE MINING CO.

ARIZONA

Idle several years. Office: 503 Hall Bldg., Kansas City, Mo. Letters unclaimed at Wagoner, Yavapai Co., Ariz. Jos. F. Gaume, pres.; J. B. Hamner, vice-pres. Lands are in the Walnut Grove district.

BIG BUTTE MINING CO.

MONTANA

Office: Butte, Mont. Company owns 20 acres on southwest flank of Timber Butte, south of the city and has a lease and bond on Carey claim

west of Walkerville, Butte. The latter claim is developed by a 287' tunnel, which is being connected with surface and a 65' crosscut driven to cut vein. Sinking is planned for 1914.

BIG COTTONWOOD CONSOLIDATED MINING CO.

UTAH

Office: 223 Boston Bldg., Salt Lake City, Utah. Mine office: Brighton, Salt Lake Co., Utah. J. M. Howell, pres. and mgr.; Fred E. Rowley, vice-pres.; Jay Eliot Johnson, sec.-treas., mine supt. and mg. engr.; preceding officers, Wm. Howell and A. M. Cheney, directors. Organized Sept., 1909, under laws of Utah, capitalization \$250,000, shares 25 cts. par; 800,000 shares issued; listed Salt Lake Exchange. Annual meeting, first Monday in October. Lands, 8 claims in South Fork, Big Cottonwood district, Salt Lake Co., carrying auriferous and argentiferous lead and copper on which work is being done. Driving crosscut tunnel, now 240', to cut fissure veins in lime and quartzite at 700' and 1,000'. No ore reserves developed, as yet.

BIG COTTONWOOD COPPER & GOLD MINING CO.

UTAH

Office: 521 Atlas Bldg., Salt Lake City, Utah. Mine office: Brighton, Salt Lake Co., Utah. Col. Nicholas Treweek, pres. and gen. mgr.; W. Mont Ferry, vice-pres.; J. Leonard Burch, sec.-treas.; preceding officers, J. E. Galligher and John S. Bransford, directors., at last accounts. Organized under laws of Utah, capitalization \$1,500,000, increased, 1906, to \$3,750,000, shares \$5 par, nonassessable. Is operated as a close corporation.

Lands, 140 acres, adjoining the Mountain Lake Consolidated Mining Co., on the southeast, and carrying same ore zone, near the head of Big Cottonwood canyon, and also in the Snake Creek district. Development is by a 30' shaft, showing ore assaying up to 8% copper, with small gold and silver values, and a 700' tunnel with about 2,000' of workings. Mine apparently has considerable bodies of sulphide ore, averaging about 5% copper and \$2 per ton in combined gold and silver values, and has secured some ore assaying 4 to 32% copper.

BIG COTTONWOOD TRANSPORTATION & TUNNEL CO.

UTAH

Letters returned from Alta, Utah. James A. Eakins, pres.; T. W. Bell, vice-pres. and mgr.; John W. Eakins, sec.-treas.; preceding officers, David James and Howard Marks, directors. at last accounts. Capitalization \$100,000, shares 10 cts. par. Incorporated about Dec., 1911, to drive a 5,000' tunnel to reach the vein on company's holdings of 300 acres. Property adjoins the Prince, Copper Prince and Alta Transportation Tunnel Co. groups. Tunnel 200' long in 1911 will cut Giles fissure.

BIG DIPPER MINING & MILLING CO., LTD.

ONTARIO

Probably dead. Office: Peterborough, Ont. Mine office: Cloyne, Ad-dington Co., Ont. J. A. Jamieson, supt., at last accounts. Lands show auriferous and argentiferous copper ores. Equipment includes a steam plant, and property was under development, with a force of about 20 men, 1908.

BIG EDDY MINING CO.

MINNESOTA

Mine near Hinckley, Minn. Organized about Jan., 1911. A. D. Wilson, pres.; D. J. Wilson, vice-pres.; E. A. Phinney, sec.-treas., at last accounts. Company has drilled lands near Hinckley mines belonging to Mr. Wilson and claims to have found payable copper values.

BIG ELK MINING CO.

MONTANA

Office: Wallace, Idaho. Mine office: Saltese Missoula Co., Mont. E. L. Proebsting, pres.; H. J. Rossi, vice-pres.; A. H. Featherstone, sec.-treas.; Peter Peterson, gen. mgr.; preceding officers and W. S. Brown, directors; C. F. O. Merriam, mg. engr. Organized April, 1909, under laws of Idaho.

capitalization \$2,000,000, shares \$1 par, assessable; fully issued. Last assessment 1 mill per share, May 23, 1913.

Lands, 15 claims, area 300 acres, unpatented, on Bald mountain, in the St. Joe district, showing 3 fissure veins in St. Regis quartzite, various trenches exposing veins with 4' thickness carrying streaks of chalcopyrite and spathic iron, in spar and quartzite. A carload shipment, to Helena, from an 18' prospect shaft, returned 28.7% copper, 28.9% iron, 15% sulphur and 2 oz. silver per ton. A 125' upper tunnel and a 200' lower diagonal crosscut tunnel show chalcopyrite and bornite, carrying small gold values. The C. M. & St. P. R. R. crosses property. Former equipment, including air compressor and mine buildings, was destroyed by the great forest fire, Aug., 1910. No shipments in 1912-13. Management considered good and property promising.

BIG FIVE COPPER CO.

WYOMING

Samuel Crowley, supt., Arlington, Carbon Co., Wyo. Property shows small vein of copper ore carrying gold and silver values, developed by shaft.

BIG FIVE TUNNEL, ORE REDUCTION & TRANS. CO. COLORADO

Office: 1824 Curtis St., Denver, Colo. D. A. Barry, supt., Idaho Springs, Clear Creek Co., Colo. W. P. Daniel, pres.; Ed. Large, sec., Denver. Organized under laws of Colorado, capitalization \$3,000,000, shares \$1 par, \$2,700,000 issued, balance to redeem \$25,000 bond issue due Oct. 1, 1912.

Property, the Central tunnel at Idaho Springs, and the Tower Mountain, Galena, Red Mountain, Mastadon Gulch, Belman, Miami-Edgar, Ni Wot-Columbia and Dew Drop mines.

The Central tunnel, paralleling the Newhouse tunnel, drains and develops the Clear Creek mine at 2,000' depth and is over 9,000' long. Equipment includes electric haulage, steam and electric power, compressor, and a 100-ton concentration mill. Employs an average of about 25 men when operating at normal capacity.

BIG HORN MINING & DEVELOPING CO.

WYOMING

Office: Thermopolis, Wyo. Mine office: Depass, Fremont Co., Wyo. Jas. Dickie, pres.; R. W. Hale, vice-pres.; A. J. Lowery, sec.; Walter Swanson, gen. mgr.; R. J. Houston, treas.; preceding officers, David Dickie, Wm. T. Wallace, Chas. Roach and Robert Huston, directors, at last accounts. Organized 1909, under laws of Wyoming, capitalization \$1,500,000, shares \$1 par, in \$750,000 preferred and \$750,000 common stock; issued, \$830,000. Annual meeting, third Monday in June.

Lands, 13 claims, unpatented, area 193 acres, in the Copper Mountain district, adjoining the Williams-Luman mine, having 2 fissure veins in diorite, traceable 3,000'. Vein under development, of 7' estimated average width, has 4 pits and shafts of 10 to 60' depth, and 4 tunnels, of 40', 75', 300' and 460', showing chalcocite, malachite, azurite, cuprite and native copper, with assays up to 30% copper and \$8 gold per ton. Mine has no power equipment. Management plans adding an electric air compressor, and extending tunnel to 900'.

BIG INDIAN COPPER CO.

UTAH

Idle. Property in San Juan Co., Utah. C. E. Loose, pres.; W. D. Loose, vice-pres.; Preston G. Peterson, sec.; preceding officers, J. T. Farrer and W. J. Stiehl, directors, at last accounts. Assessment of 1.8 cts. levied on stock about April 25, 1913.

BIG INTERIOR COPPER MINES.

BRITISH COLUMBIA

Mine office: Alberni, Vancouver island, B. C. Lands, 7 claims, area 350 acres, at the head of Great Central lake, 12 miles from Alberni, at an elevation of 5,000' above sea level. Property shows a brecciated zone in

granite with considerable impregnation of copper sulphides, low in grade, but with ore in immense quantities, claimed to be available for concentration, if given transportation facilities. Only development is a 31' tunnel. Appears to have making of a great mine.

BIG INTERIOR GOLD MINES, LTD.

BRITISH COLUMBIA

Alvo von Alvensleben, pres.; A. J. Engvick, sec. Owns the Della group of 5 claims, located 9 miles above Great Central lake near Big Interior copper mine. Claims show a vein of gold-copper ore in porphyry, from 1½ to 5' wide, running north and south and proven by open cuts for a length of 1,700'. Property reported on by W. K. Edwards, whose 2 sets of samples averaged \$25 and \$15.44 per ton in gold.

BIG MITT MINING CO.

UTAH

Apparently dead. Office: Salt Lake City, Utah. Mine office: Brigham, Salt Lake Co., Utah. At last accounts, 1911, an option on controlling interest in the stock was held by G. S. Holmes, Jr. Lands, near the mouth of Little Cottonwood canon, have a tunnel of about 100', with a 100' winze cutting a 4 to 6' stringer of high-grade copper-gold ore.

BIG SEVEN GROUP.

ARIZONA

Near Harrington, Yavapai Co., Ariz. Mine reported to have 36% copper ore, 1913.

BIG SPRINGS MINING CO.

ARIZONA

Mine office: Paradise, Cochise Co., Ariz. C. W. McCoy, mgr. Organized 1907. Lands, variously reported as 7 or 11 claims, are known as the Claire group, near Wood canon. Vein has a 2' paystreak, carrying mainly silver-lead ore, with a little argentiferous copper ore, all more or less auriferous, opened by a 165' tunnel. Property shipped a little silver-lead ore to El Paso, and copper ore to Douglas. Company doing assessment work only.

BIG THREE MINES.

NEW MEXICO

Situated 3 miles north of Organ, Dona Ana Co., N. M. Property shows copper, silver and lead deposits. Workings 150' deep, at last accounts.

BIG VEIN COPPER CO.

ARIZONA

Formerly at Tucson, Pima Co., Ariz. Out of business. Operations of this company fully described Vol. X.

BIGHAM MINE.

PENNSYLVANIA

At Charmian, Pa. Is a small property in the South Mountain copper belt, showing native copper and oxides in Cambrian trap rocks.

BIGOT COPPER MINES.

NEVADA

Owned by Bigot Bros. and Greeley French estate. Carson City, Nev. Property, patented claims in Jacks valley, Ormsby Co., bonded Sept., 1912, for \$300,000, with stipulation that property be worked within 30 days and a 500-ton Foss reduction plant be put up within a year. Developed by tunnels showing gold-silver bearing chalcopryrite and bornite ore.

BILL TAFT MINING CO.

UTAH

Letters neither answered or returned. Mine office: Eureka, Juab Co., Utah. Geo. A. Taylor, pres.; Walter A. Harper, vice-pres.; Ralph A. Badger, sec.-treas.; preceding officers, John R. Vance, Wilford Hays and D. W. Craig, directors, at last accounts. Organized July, 1909, under laws of Utah, capitalization \$10,000, shares 1 ct. par. Property is in the North Tintic district.

BILL WILLIAMS MINING & DEVELOPING CO.

ARIZONA

Letter unclaimed at Planet, Yuma Co., Ariz. Lands include the Ely and M. & M. groups, the Ely, adjoining the Blue Bell on the south, having a 4' vein, said to average 9% copper and \$5 gold per ton. The M. & M.

group, of 14 claims, north of the Signal ranch, carries a vein of 13' reported width, with ore giving assays of 3 to 35% copper. Presumably idle.

BILLY BOY MINES.

ARIZONA

E. Block, owner. Property on the Hassayampa river, Yavapai Co., Ariz., developed by 300' tunnel showing 14" paystreak carrying gold, silver and copper ore assaying \$20 per ton.

BINGHAM AMALGAMATED COPPER CO.

UTAH

Office: 61 Commercial Block, Salt Lake City, Utah. Letter returned unclaimed from former mine office, Bingham Canyon, Salt Lake Co., Utah. B. F. Grant, pres.; L. A. Marks, vice-pres.; F. R. Snow, sec.-treas.; Jos. E. Edmunds, gen. mgr.; preceding officers, W. P. Davis, R. E. Miller and Dr. A. McCurtain, directors. Organized Jan. 7, 1907, under laws of Utah, capitalization \$5,000,000, shares \$5 par, nonassessable; issued, \$3,500,000. Shares are listed on the Salt Lake City Stock Exchange.

Property, 24 claims, 300 acres patented, known as the Illinois and Copper Glance groups, carrying 7 mineralized veins. The principal orebodies exposed in the Bingham Amalgamated are on the same vein as the Congor orebodies and of about the same character of ore. Vein is 15 to 40' thick, developed for several hundred feet in depth, but the water and high cost of wagon haul has stopped further development. In a tunnel on the west side of the property, a 20' vein shows streaks of good ore all through it. The Montana Bingham tunnel will cut this vein about 1,000 deeper and when this tunnel is completed the Bingham Amalgamated will start development and extraction of ore.

The Illinois has a 640' shaft, with a 6 to 9' vein carrying a 2' paystreak of about 5% copper ore, with occasional assays up to 40%, the average of 50 assays being 2.8% copper, 2 oz. silver and \$2 gold per ton. The Copper Glance group has a 1,400' tunnel, in McGuire gulch. Mine has a total of 2,450' of workings, and ore, including chalcopryite, bornite, chalcocite and cuprite, is estimated by management to average 3% copper, 2 oz. silver and 90 cts. gold per ton. Property closed down, 1912.

BINGHAM-BAY STATE COPPER CO.

UTAH

Idle, pending completion of work on neighboring properties. Mine at Bingham Canyon, Salt Lake Co., Utah.

BINGHAM BUTTE CONSOLIDATED MINING CO.

UTAH

Succeeded, June, 1910, by Montana-Bingham Consolidated Mining Co. Mine near Bingham Canyon, Salt Lake Co., Utah. Producing 1913.

BINGHAM-BUTTE COPPER CO.

UTAH

Office: 419 D. F. Walker Bldg., Salt Lake City, Utah. Mine office: Bingham Canyon, Salt Lake Co., Utah. John F. Cowan, pres.; Abram Hanauer, Jr., sec.; Geo. A. Bellinger, supt. Organized 1907, capitalization \$5,000,000, shares \$5 par, and apparently is a holding company for stocks of Copper Hill Mining Co. and Midland Mining Co. Is no relation to Bingham Butte Consolidated Mining Co.

Lands, 225 acres, patented, including the Copper Hill group, opened by 2 tunnels on the Caledonia fissure, upper tunnel giving ore assaying up to 25% copper, 35% lead, 26 oz. silver and \$9 gold per ton. Property also has a 2' vein, said to assay 5% lead, 54 oz. silver and \$11 gold per ton. Equipment includes shipping bins at mouth of the lower tunnel, near railroad track. Producing in 1913.

BINGHAM CENTRAL MINING CO.

UTAH

At Bingham Canyon, Salt Lake Co., Utah. Idle. This company and the Bingham Standard Copper Co. were controlled by the Bingham Central Standard Copper Co., which sold this stock, 1909, to Utah Metal Mining

Co. for stock in latter company and is now controlled by the Utah Metal Mining Co. Described Vol. X.

BINGHAM CENTRAL-STANDARD COPPER CO.

UTAH

Office: 66 West Third South St., Salt Lake City, Utah. Former mine office was Bingham Canyon, Salt Lake Co., Utah. T. H. Quillan (Mayor of Bingham), pres.; E. W. Clark, vice-pres.; F. T. Hiatt, sec.; H. P. Clark, treas.; preceding officers, R. W. Sampson and W. E. Hubbard, directors. Organized 1907, under laws of Wyoming, capitalization \$5,000,000, shares \$5 par, nonassessable; issued, \$4,500,000. Bonds, \$375,000 at 6% authorized; \$347,000 issued. Was organized as a holding company, controlling, through ownership of practically entire stock issues, the Bingham Central Mining Co. and Bingham Standard Copper Co., and sold these subsidiary stocks, 1909, to the Utah Metal Mining Co. for 300,000 shares of latter, which was escrowed until 1911 and extended upon payment of 10,000 additional shares until Nov. 8, 1912, and subsequently to Jan. 1, 1914, to permit building by Utah Metal Mining Co. of a \$150,000 aerial tramway from the western end of the big tunnel to the International smelter at Tooele. On release of escrow, 1914, company will be wound up.

BINGHAM COPPER BOY MINING CO.

UTAH

Address: care Walter A. Cook, 422 McCornick Bldg., Salt Lake City, Utah. Mine near Lincoln, Tooele Co., Utah. Abram Hanauer, Jr., pres.; A. B. Firth, vice-pres.; J. H. Hurd, sec.; W. A. Cooke, treas. Organized Feb 19, 1901, under laws of Utah, capitalization \$1,500,000, shares \$1 par. Annual meeting, first Monday in March.

Lands, 13 claims, 11 patented, area 143 acres, on the Tooele side of the divide, also an 11-acre mill site, in Carr Fork canon. Lands are in the western part of the Bingham camp, somewhat out of the developed district, lying west of the Highland Boy mine of the Utah Consolidated, and apparently carrying a continuation of the Utah-Apex orebodies. Mine has an 800' crosscut tunnel and a 2,000' lower tunnel, with other workings. Out of funds and idle several years, with no sale or market for the stock, so far as known.

BINGHAM COPPER CO. (OF WYOMING).

UTAH

Dead. Went into voluntary bankruptcy March 26, 1912, and property sold at sheriff's sale for \$20,000, being bought in by H. M. Stonemetz for reorganization committee. Reorganized as Utah Lead & Copper Co., incorporated about Feb. 1913, in Maine, with capital of \$500,000, shares \$1 par; \$100,000 first mortgage 10-year bonds are to be issued. Stockholders of old company who paid assessment of 5 cts. a share, receive 1 share of new stock for 4 shares of old with bonds equal to assessment paid in, together with a bonus of 1 new share per dollar paid in. Property had stock exchange value of \$37,000,000 in 1906. (See Vol. X; also Utah Lead & Copper Co.)

BINGHAM COPPER TUNNEL CO.

UTAH

In Aug., 1912, this company absorbed the Bingham West Dip Tunnel Co., and will continue its work. At that date the tunnel was 2,000' long. It is a transportation and drainage project with incidental mining prospects. Portal will be in Pine canyon in Tooele valley; its course from there is southeasterly, to pass beneath the Utah Copper Co.'s property, a total distance of 20,000'.

BINGHAM MARY COPPER CO.

UTAH

Office: 161 South Main St., Salt Lake City, Utah. Letter returned unclaimed from former mine office, Bingham Canyon, Salt Lake Co., Utah. Simon Bamberger, pres. and mgr.; J. B. Bean, sec.-treas.; Jas. Start, supt. Organized 1905, under laws of Utah, capitalization \$2,500,000, shares \$5 par.

Lands, 2 claims, patented, area 40 acres, in Carr fork, near the Utah Apex, and company brought suit against the Utah Apex, claiming illegal ore extraction. Development is by an 875' shaft, with 2 levels opened, showing low-grade ore, said to give assays of 4.7% copper, up to 12 oz. silver and \$1 to \$3 gold per ton. Equipment includes a 1,500' electric hoist, several small mine buildings, and a tramway to the Rio Grande Western railway. Mine closed down, 1913.

BINGHAM MINE.

PENNSYLVANIA

Now owned by the National Copper Co.

BINGHAM MINES CO.

UTAH

Office: 60 Congress St., Boston, Mass. Operating office: 404 Dooly Bldg., Salt Lake City, Utah. Mine office: Lark and also Bingham Canyon, Salt Lake Co., Utah. Jas. P. Graves, pres.; Sydney S. Millet, sec.-treas.; preceding officers, Henry N. Sweet, Alfred B. White, Thos. S. Woods, Arthur W. Chesterton and Lewis B. McCornick, directors; Imer Pett, gen. mgr.; J. E. Bergh and Jos. Hyland, mine supts.; Fred R. Sands, purch. agt.; Z. P. Billings, mg. engr., and J. I. Robbins, chemist-assayer. Organized, April 7, 1908, under laws of Maine, capitalization \$1,500,000, shares \$10 par, nonassessable; issued, \$945,560. Bonds outstanding, \$455,000 first-mortgage, issued by Bingham Consolidated Mining & Smelting Co., and \$577,789 second-mortgage noncumulative bonds of the Bingham Mines Co., both at 6%. Is a reconstruction of the Bingham Consolidated Mining & Smelting Co., having exchanged 1 share of new stock for 1 of old, plus \$3.50 cash, payable \$1 cash and five 50-ct. installments. Controls the Eagle & Blue Bell Mining Co., of Eureka, Juab Co., Utah, and Yosemite Mines Co., of Bingham Canyon, Salt Lake Co., Utah, through ownership of \$451,250 out of \$900,000 issued stock.

Second-mortgage bonds were issued in settlement of claims against the old company. First National Bank, Boston, transfer agent. Federal Trust Co., Boston, registrar. Stock is listed on the Boston curb. Annual meeting, third Wednesday in April, at 57 Exchange St., Portland, Me.

The annual report for year ending Dec. 31, 1912, showed net earnings \$144,022, an increase of \$26,742 over 1911, which is an excellent record, especially in view of a 6-weeks' labor strike at the mines, and a 3-months' additional shut-down of the Commercial mine owing to foul air.

Lands, 500 acres, in 2 groups, in the West Mountain district, known as the Dalton & Lark and Commercial mines. These properties have a considerable variety of ores, principally sulphides, carrying fair gold and silver-lead values at and near surface, with increasing copper values at depth. Combined gold and silver values average about \$2 gold per ton, and some of the ores are high in iron, hence desirable for fluxing the ores of the district, which are highly silicious as a rule. The Mascotte tunnel, formerly owned, was sold to F. Augustus Heinze, for \$177,000. The company now has the deepest shaft in the Tintic district, as connection is made between the Mascotte tunnel and the Yosemite shaft, a vertical distance of 2,200', opening a large territory for prospecting.

The Dalton & Lark group comprises 55 claims, patented, area 424 acres, with 306 acres miscellaneous lands, carrying the Brooklyn, Lark and Lead veins. Property shows contact deposits between quartzite and limestone, occurring mainly as replacements of lime at and near the contact. Average strike of veins is S. 50° W., with average dip of 38° with horizon. The Dalton & Lark group includes the Brooklyn mine, and produces both lead and copper ores of shipping grade, copper being in the form of chalcoppyrite. The Brooklyn vein is up to 200' in width, 8,000' long and proven to

depth of 2,000'; the Lead vein up to 180' in width, with length of 6,200' and proven depth of 1,300'; the Lark vein, of 6' average width, is proven for 6,200' length and 1,400' depth. Property is now operated through the 3-mile Mascotte tunnel, and also has the 600' Lead mine tunnel and 3,200' Brooklyn tunnel, both of which are abandoned, and the following abandoned shafts: Dalton No. 1, of 600'; Dalton No. 2, of 1,300'; Sampson, of 1,100'; Revere, of 420'; Antelope, of 700'; Revere Gladstone, of 350'; Richmond, of 300'. Lead ores of the Dalton & Lark group run up to 40% in tenor, and copper ores are 1.25 to 5% in tenor, both lead and copper ores being more or less auriferous and argentiferous, with occasional streaks carrying high-grade precious metal values. Production, secured mainly between the 1,300' and 2,000' levels, is nearly 200 tons daily, about half silver-lead and half copper ore. A large amount of low to medium grade ore is in sight.

Equipment at the Dalton & Lark includes a 250-h. p. steam plant, with 2 hoists and a 25-drill Ingersoll-Rand air compressor. There are 10 buildings, including a 25x50' machine shop, 25x30' smithy, 20x30' carpenter shop, office and dwellings. A private rail line, with electric locomotives, connects with the Denver & Rio Grande railway.

The Commercial mine, 7 claims, patented, area 62 acres. The main orebody occurs as a contact between quartzite and limestone and replacement in latter, with a strike of S. 50° W. and average dip of 38° with the horizon. Ore is exclusively chalcopyrite. The 140' Commercial No. 1 shaft and 350' main incline shaft have been abandoned, as have the 1,550' upper Commercial tunnel and 2,000' lower Commercial tunnel. Commercial No. 2 shaft has a depth of 500' below the lower Commercial tunnel. The old upper and lower tunnels were abandoned, Sept., 1910, through a joint agreement with the Utah Copper Co., Niagara Mining & Smelting Co., and Silver Shield Mining Co., by which the Bingham Mines Co. abandons Copper Center gulch as dumping ground for the Utah Copper Co., and is allowed the use of the Niagara Mining & Smelting Co. tunnel, which has been lengthened to cut the Commercial orebodies at a depth of about 1,400' on the plane of the vein.

Equipment of the Commercial mine is exclusively electric, including a double-drum electric hoist with 52-h. p. induction motor, 75-h. p. induction motor, a 10-drill Ingersoll-Rand air compressor, and three 50-kw. electric transformers. Buildings, removed, 1910, to a new site, near the mouth of the Niagara tunnel, include an office, warehouse, sawmill, smithy, barn and ore bins. Mine is served by the Copper Belt line of the Denver & Rio Grande railway.

The company owned a smelter at Midvale, near Murray, Salt Lake Co., Utah, closed, 1907, by order of the Federal courts, on account of alleged damage by fumes. The smelter was scrapped and the material sold in March, 1913.

Production, formerly shipped to Yampa smelter, is now divided, silver-lead ores going to the Murray smelter of the American Smelting & Refining Co., and copper ores to the Garfield smelter. Net earnings were \$55,774.92 in 1909, \$65,902.33 in 1910, \$109,248 in 1911 and \$138,113 in 1912. On May 1, 1912, \$81,000 first-mortgage bonds were redeemed and canceled. In 1913, there will be \$145,067 available for bond redemption.

Production by present company was 1,427,770 lbs. copper, 3,777,320 lbs. lead, 225,763 oz. silver and 3,731 oz. gold in 1912, this not including the considerable production of the Eagle & Blue Bell. The present management has made splendid progress in working out from under the great load of debt and difficulties left by its predecessor.

BINGHAM NEVADA MINING CO.**NEVADA**

Mine at Goodsprings, Lincoln Co., Nev. Idle; letters returned unclaimed, 1913. See Vol X.

BINGHAM-NEW HAVEN COPPER & GOLD MINING CO. UTAH

Office: P. O. Box 84, New Haven, Conn. Operating office: 508 McCormick Bldg., Salt Lake City, Utah. Mine office: Bingham Canyon, Salt Lake Co., Utah. Louis E. Stoddard, pres.; E. B. Critchlow, vice-pres.; T. W. Farnam, sec.-treas.; preceding officers, E. G. Stoddard and F. F. Brewster, directors; C. H. Doolittle, gen. mgr.; B. B. Lawrence, cons. engr.; F. N. Wichman, mine supt. Organized Oct. 12, 1902, under laws of Utah capitalization \$2,000,000, shares \$5 par, nonassessable; issued \$1,143,445. A \$46,000 bond issue was paid, 1909. Dividends have been paid since 1906 amounting to \$251,557 in 1911 and \$68,606.70 in 1912, or a total of \$434,500 to date. Union Trust Co., New Haven, registrar. Annual meeting, first Tuesday in May. Property, 26 claims, 500 acres, adjoining the Utah Consolidated on the southeast, includes the Zelnora mine, near the head of Carr fork. Claims show 3 fault fissures in porphyry and a contact deposit between quartz-porphyry and limestone. The latter of 3 to 8' width, carries 2 to 6% copper, 10 to 22% lead, 7 to 8 oz. silver and 40 to 80 cts. gold per ton, ores being chalcopryrite, galena and sphalerite. The main ore supply is from 3 beds of limestone which strike E.-W. and dip north. In 1910, a large deposit of ore averaging 4½% copper and \$5 in precious metals per ton, yielded large profits permitting the extraordinary dividend of \$1.10 per share in 1911. Company now mining 2 deposits of copper, 2 of lead and 1 of complex ore. In 1911, 85,426 tons of ore was shipped yielding \$838,780.

Development by tunnels with a blind shaft starting 900' from the portal of the lowest tunnel, there being a vertical distance of 1,200' between the highest and lowest workings. The 1,030' lower tunnel cuts a wide fissure vein, giving assays of about 3% copper, 2.3 oz. silver and \$2.50 gold per ton. Terminal at the upper tunnel was moved to the lower tunnel, and mine is operated through the latter. Mine has about 3 miles of workings, with an aerial tram connecting with loading bins on the Copper Belt railroad.

Equipment includes electric power and an air compressor. The 80-ton mill was remodeled, 1912, and Isbell vanners installed. The completion of a connection with the main working tunnel of the Utah Consolidated Copper Co. in Dec., 1912, permits shipments over that company's tram line to the Tooele smelter, reducing transportation costs 20 cts. per ton. A new smelting contract made with the International smelter at Tooele in 1913 is expected to greatly increase the company's earnings.

BINGHAM & ORLEANS MINING CO.**UTAH**

Office: 70 Commercial Bldg., Salt Lake City, Utah. Mine office: Bingham Canyon, Salt Lake Co., Utah. A. W. Mente, pres. and treas.; D. H. Wenger, vice-pres.; Wade Loofbourow, sec.; preceding officers, Henry Harker and E. V. Benjamin, directors; R. A. Hasbrough, mgr., at last accounts. Organized Sept. 21, 1908, under laws of Utah, as successor of St. Joe Mining Co., capitalization \$500,000, shares \$1 par, assessable; issued, \$178,613.

Lands, 19 claims, 17 patented, area 185 acres, showing a contact ore-body between limestone and quartzite, carrying sulphide ore estimated to average 2% copper, 8% lead, 32% zinc, 12 oz. silver and \$1 gold per ton. Development is by shafts of 50' and 120', and by 10 tunnels, 2 longest 1,150' and 3,250', with a total of 5,610' of workings. Equipment includes a 90-h. p. steam plant, 8-h. p. gasoline hoist, and 2-drill air compressor. Presumably idle.

BINGHAM STANDARD COPPER CO.**UTAH**

Office: Salt Lake City, Utah. Organized 1906, capitalization \$5,000,000, shares \$5 par, as successor of Standard Copper Co., controlled by Bingham Central-Standard Copper Co., which sold control, 1909, to Utah Metal Mining Co. Stock escrowed until Jan., 1914, after which company will be dissolved and assets distributed.

BINGHAM WEST DIP TUNNEL CO.**UTAH**

Office: 1505-277 Broadway, New York, N. Y. Operating office: 120 West Second South St., Salt Lake City, Utah. Mine office: Tooele, Tooele Co., Utah. Francis M. Lyman, pres. and gen. mgr.; Frances M. Lyman, Jr., vice-pres.; Milando Pratt, sec.; F. M. Bishop, treas. Organized 1890, under laws of Utah, capitalization \$2,500,000, shares \$1 par, nonassessable. Lands, 30 claims, unpatented, area 520 acres, 5 miles from a railroad, said to show auriferous and argentiferous lead and copper ores. Development is by tunnel of 2,000', planned to be driven 4 miles from the Tooele side through the Oquirrh Mountain range, to drain the entire West Mountain district, develop mineral bodies, and provide water for irrigating lands. Equipment includes gasoline power, air compressors, ventilating fan and several buildings. Apparently the plan of this company, begun more than 20 years ago, is being carried out by the Utah Metal Mining Co. Is not regarded favorably. Apparently dead.

BINGHAMTON COPPER QUEEN MINING CO.**ARIZONA**

Mine at Stoddard, Yavapai Co., Ariz. Controlled by Stoddard Mines Co. Developed by a shaft, planned to be deepened to 800' level, carrying copper ores, with values mainly in gold. Opened a new ore shoot of copper ore in 1913. Equipped with steam power.

BISBEE COALITION MINING CO.**ARIZONA**

Mine office: Bisbee, Cochise Co., Ariz. Ernest H. Clark, pres. and gen. mgr.; V. W. Marshalls, vice-pres.; R. J. Clark, sec.-treas.; Jas. Smoot, supt.; preceding officers, Oscar Zapf and W. E. Davis, directors. Organized 1909, under laws of Arizona, capitalization \$3,000,000, shares \$1 par. Company absorbed the North Bisbee Development Co., 1909, paying for same in stock.

Property, 45 claims, in Tombstone canyon, 3 to 7 miles northwest of Bisbee, including the Eureka group of 15 claims, near the Modern mine, taken over from the Eureka Mining Co. and the North Bisbee group of 23 claims, taken over from the North Bisbee Development Co. Development includes a 360' tunnel and 500' shaft, said to show veins of 2 to 20' width, carrying ore averaging 12% copper with \$15 combined gold and silver values per ton.

BISBEE & DULUTH MINING & DEVELOPMENT CO.**ARIZONA**

Mine office: Bisbee, Cochise Co., Ariz. Is controlled, through ownership of 60% of stock issue, by Bisbee-Sonora Development Co.

BISBEE EXTENSION MINING CO.**ARIZONA**

Office: 200 Fifth Ave., New York. Mine office: Bisbee, Cochise Co., Ariz. F. R. Poss, pres.; R. B. Tannahill, vice-pres.; J. M. Low, sec.-treas.; preceding officers, F. C. Huston and F. J. Narin, directors; Geo. W. Long, supt. Organized Jan., 1911, capitalization \$2,500,000, shares \$10 par, as successor of Bisbee Extension Development Co., giving 3 shares of new stock for 1 of old; issued, \$1,200,000.

Lands, 27 claims, area 603 acres, in Tombstone canyon, 8 miles northwest of Bisbee, on the porphyry side of the gulch. Property shows upper carboniferous limestone strata, with and adjacent to the northwestern end of the main disseminated porphyry stock of the district. In Bisbee, to the southeast, ore is mined mainly from the lower carboniferous lime-

stone. Property shows fissure veins in granite-porphry, carrying cuprite, azurite and malachite. Development is by 5 shafts, the 2-compartment main shaft being more than 800' deep, and decidedly wet. Mine has about 2,000' of drifts and crosscuts on the 400' level, passing through about 600' of leached material, markedly similar to that overlying the large orebodies of Bisbee.

Equipment includes a 10x12" steam hoist, good for 1,200', a 22-h. p. Fairbanks & Morse gasoline hoist, good for 800', a 60-h. p. gasoline engine and a 6-drill Sullivan air compressor. Management hopes to be able to develop orebodies in the Escobrosa limestone, supposedly lying in the geological horizon of the main orebodies in Bisbee. Regarded as unpromising ground.

BISBEE-SONORA DEV. CO.

ARIZONA & NEW MEXICO

Office: Douglas, Ariz. Mine office: Paradise, Cochise Co., Ariz. H. C. Beumler, pres.; J. P. Sexton, vice-pres.; S. S. Badger, sec.-treas. and mg. engr.; G. T. Colvin, supt. Organized Feb., 1907, under laws of Arizona, capitalization \$2,500,000, shares \$2 par, as successor of the Paradise Development Co. Annual meeting, second Tuesday in March. Is a holding company only, controlling, through stock ownership of 60% of stock issue of each, the Badger-Hall Mining Co. and Paradise Mining Co., near Paradise. Properties are described as a unit, under the title of this company, instead of separately.

Holdings, 35 claims, 595 acres in the California mining district in the Huachuca mountains, near Paradise, Ariz. Lands include the town site of Shamrock, 22 miles from Rodeo, the nearest rail point, in which some lots have been sold. The lands lying mainly between the Manhattan and Sullivan properties, are developed by 4 tunnels, 287', 170', 560' and 125' long and by 2 shafts 240' and 80' depth respectively. The Badger-Hall property, 30 claims, area 540 acres, is claimed to show an orebody 62' wide at surface and 50' wide at 200' depth, where cut by tunnel. The Paradise property near the Badger-Hall has a crosscut, said to show medium-grade sulphide ore. The Morning Star group of the Paradise Mining Co., lying west of the Cochise Development Co., has a 90' tunnel, showing a little auriferous and argentiferous carbonate and sulphide ore. Ore occurs as contact deposit running northwest-southeast and dipping at 18° southwest, that lies between limestone and porphyry. Deposit exposed for 600' length and 100' width and to depth of 280', said by management to average 4% copper and 18% lead with \$1.50 in gold and 12 oz. silver per ton. Discovered in 1905 and continuously worked. Has a whim, blacksmith shop and company store.

BITTER CREEK MINING CO.

BRITISH COLUMBIA

Office: Vancouver, B. C. Mine office: Stewart, Cassiar district, B. C. J. J. Logan, pres.; J. S. Rankin, sec.-treas., at last accounts. Organized Dec., 1909, under laws of British Columbia, capitalization \$200,000. Lands, 12 claims, area 600 acres, in Brown's gulch, Bitter creek, in the Portland Canal district, developed by a 35' tunnel showing ore giving assays up to 22.2% copper, 16.48 oz. silver and 0.12 oz. gold per ton.

BLACK BEAR MINING CO.

COLORADO

Idle. Mine office: Telluride, San Miguel Co., Colo. Oscar Mantilla, supt., at last accounts. Mine carries auriferous and argentiferous sulphides of lead, copper and zinc. Equipment includes an electric plant, 20-stamp mill and 75-ton concentrator.

BLACKBIRD COPPER & GOLD MINING CO., LTD. IDAHO & UTAH

Office: 807 Newhouse Bldg., Salt Lake City, Utah. Mine offices: Newhouse, Beaver Co., Utah, and Salmon, Lemhi Co., Idaho. John E. DuBois,

pres.; Chas. J. North, vice-pres.; F. O. Frick, sec.; B. N. Lehman, treas. and gen. mgr.; preceding officers and L. N. Morrison, directors, at last accounts. Organized under laws of West Virginia, capitalization \$2,000,000, shares \$1 par, nonassessable. Bonds, \$500,000, at 6%. Annual meeting, fourth Tuesday in January. Is a close corporation and has neither answered nor returned letters sent them.

Lands include Brown Bear mine and adjoining property covering 29 claims, patented, area 482 acres, in the central part of the Blackbird district, Lemhi Co., Idaho. Development 2,500' by 3 shafts, with drifts and numerous short tunnels. Orebodies are irregular replacements along fracture zones in schist and quartzite. Idaho property is in one of the best mineralized sections of the state and is said to show wide zones of disseminated ore carrying 2½% copper and 50 cts. gold for each per cent copper. This district is regarded as promising. Property shut down since patenting.

Company also owns 97 claims, 87 patented, adjoining the Cactus mine in the San Francisco district of Utah. This property has considerable development and was explored by diamond drilling in 1910. In the winter of 1911-12 mine was reopened, new machinery ordered and development of the 300' level from an old shaft disclosed a vein of chalcopyrite ore.

BLACK CHIEF COPPER CO.

ARIZONA

Idle. Mine near Dewey, Yavapai Co., Ariz. Lands, 6 claims, known as the Uncle Sam group, having several short tunnels and shallow shafts, one 84' deep, with considerable water in the bottom, all showing ore giving assays up to 22% copper. Has a hoist.

BLACK COPPER CO.

NEVADA

Mine near Yerington, Lyons Co., Nev. Property adjacent to Montana-Yerington group of claims, developed by 260' tunnel being driven to cut vein at 350'.

BLACK COPPER CO.

NEW MEXICO

Mine office: Elizabethtown, Colfax Co., N. M. Property has no copper.

BLACK DIAMOND COPPER MINING CO.

NEVADA

Idle. Address, care Wm. D. Thompson, pres.; 524 Monument Sq., Racine, Wis. Mine near Yerington, Lyon Co., Nev. John W. Owen, vice-pres.; Louis W. Trankle, sec; preceding officers, and Adam I. Wood, directors; T. M. Hammond, cons. engr. Organized April 9, 1907, under laws of Nevada, capitalization \$1,000,000, shares \$1 par, nonassessable; issued, \$651,000.

Lands, 8 claims, 3 patented, area 120 acres, 6 miles east of Yerington, showing granodiorite and limestone, carrying contact deposits and fissure veins, of 4 to 9' width, of which one, under development, has several shallow shafts and 500' of tunnels. Principal work is on Diamond No. 2 claim, with a tunnel run to cut a considerable body of sulphide and carbonate ore shown on surface where average assays are about 3% copper.

BLACK DIAMOND-ISABEL GROUP.

ARIZONA

Property in Santa Rita mountains, Pima Co., Ariz. Bonded, July, 1912, by M. P. Freeman, of Tucson, to Fred Challman of Bisbee, Ariz. Ore complex, carrying argentiferous galena and copper. Property made shipments to El Paso smelter in 1912.

BLACK EAGLE MINING CO.

WASHINGTON

Idle. Letters unclaimed at Chewelah, Stevens Co., Wash. G. A. Mowatt, mgr., at last accounts. Lands, 160 acres, 2 miles west of Chewelah, having a 300' tunnel showing copper ore and free gold.

BLACK EAGLE MINING & MILLING CO.

OREGON

Office and mine: Gates, Marion Co., Ore. Presumably idle. See full description, Vol. X.

BLACK FOREST MINING & SMELTING CO.**NEVADA**

Apparently idle. Letters unanswered, 1913. Mine office: Wells, Elko Co., Nev. C. M. Spence, gen. mgr., at last accounts. Mine has a 400' shaft, showing argentiferous and auriferous copper and lead ores, mainly silver-lead in upper workings, but at depth of 350' the vein carries copper sulphides giving assays of 25 to 30% copper, which it is planned developing. Equipment includes water power, and a 25-ton smelter with a lead stack. Mine has been, for some years, a small producer of silver-lead matte.

BLACK HILLS COPPER CO.**SOUTH DAKOTA**

Idle. Office: Benton Harbor, Mich. Mine near Rochford, Pennington Co., S. D. E. A. Hoffman, pres.; George M. Thresher, sec.; John H. Kerr, treas. Organized June 2, 1900, under laws of South Dakota, capitalization \$2,000,000, shares \$1 par. Lands, 27 claims, area 510 acres, in the Hornblende district, showing fissure veins in slate, with heavy gossan capping, carrying carbonate and oxide ores. Orebody under development is said by company to average 20' width, and to be more than a mile in length, opened by incline shafts of 800', 40' and 75', with crosscut tunnels of 65' and 300', giving a total of about 1,200' of underground openings. Ores average 1.5 to 3% copper, with small values in gold, silver and nickel and a carload shipment of carbonate ore gave smelter returns of 16.31% copper. Has steam power, with 60-h. p. hoist, good for 1,500', and 4 power drills.

BLACK HILLS COPPER CO., LTD.**ARIZONA**

Office: 206 Magee Bldg., 336 Fourth Ave., Pittsburgh, Pa. John G. Messner, pres.; Peter Boyd, vice-pres.; J. H. Mitchell, sec.-treas.; preceding officers, A. G. Barnett, Wm. J. Crittenden, J. W. Renner, D. N. Richards, Wm. Ruske, all of Pittsburgh, and H. B. Staver, Chicago, directors. Organized July, 1899, and reorganized May 20, 1901, under laws of Arizona, capitalization \$3,000,000, shares \$1 par. Issue of \$250,000 of \$100. 6% gold bonds authorized Feb., 1912, with 100% stock bonus, but only \$18,000 sold. Union Trust Co., Pittsburgh, registrar. Colonial Trust Co., Pittsburgh, transfer agent. Company issued final appeal to stockholders, March 1, 1913, to save property from foreclosure.

Lands, 9 claims, 6 patented, area 280' acres, in the Verde district, between the United Verde and Equator mines. Opened by shafts of 212' and 675' and tunnels of 60' and 90', with 2,500' of openings. Main shaft, at 382', cut a stringer of ore assaying up to 13% copper and 3 oz. silver. Has a 280-h. p. steam plant, with 125-h. p. tubular high-pressure boiler, duplex pump, hoist and power drills. Did some work, 1905-07; since idle, owing to lack of funds. Property well located, directorate excellent and late developments in district make claims valuable. Favorably considered if put in charge of competent engineer.

BLACK HILLS & DULUTH COPPER MG. CO.**SOUTH DAKOTA**

Idle. At Custer, Custer Co., S. D. Described Vol. X.

BLACK HILLS GOLD & COPPER MINING CO.**ARIZONA**

Office and mine: Prescott, Yavapai Co., Ariz. R. H. Burmister, gen. mgr., at last accounts. Lands, in the Black Hills district, are but slightly developed. District favorably regarded but property idle and exact holdings of company unknown. Letters unanswered.

BLACK JACK CONSOLIDATED MINING CO.**UTAH**

Office: Provo, Utah. Mine office: Mammoth, Juab Co., Utah. Jesse Knight, pres.; H. G. McMillan, vice-pres.; W. Lester Mangum, sec.-treas.; preceding officers, J. Wm. Knight and S. D. Kimball, directors; E. F. Birch, asst. mgr. Organized 1907, under laws of Utah, capitalization \$100,000, shares 10 cts. par, assessable, as a merger of the Black Jack Mining Co. and

Star Consolidated Mining Co. Is controlled by the Knight Investment Co. Shares are listed on the Salt Lake Stock Exchange.

Development is by a 2,000' tunnel and a 1,400' two-compartment shaft, planned to be deepened eventually to 2,000'. The 1,000' level shows auriferous copper ore, of fair tenor, in broken ground, and the bottom level, at 1,400', showed a 10' vein carrying silver-lead ore. Mine also has some copper ore high in iron, available for fluxing use. Production, 1912, was 1,468,417 tons iron ore, 771.4 tons silver-lead ore by leasers, 35 tons lead-silver ore by company, above tonnage yielding: Copper 14,197 lbs., lead 68,976 lbs., silver 7,956 oz., gold 151.8 oz. Results to date, discouraging, although 24,988' of work has been done from the 200' to the 1,500' level of which 640' was done in 1912. New workings have passed from white into gray limestone, considered more favorable for ore.

Management plans continuing prospecting the southern section of the property on the 300' and 600' levels. Production insufficient to pay operations under present conditions.

BLACK JACK COPPER MINING CO.

MONTANA

Mine office: Clancey, Jefferson Co., Mont. H. M. Brooks, supt., at last accounts. Organized June, 1907, capitalization \$400,000. Property adjoins the Boston & Corbin on the east and has a 250' shaft, with about 450' of workings, showing auriferous and argentiferous copper ore, from which several small shipments have been made. Has steam power. Plans (May, 1913) to develop by extension of 1,200' level of Boston & Corbin mine into property; otherwise to sink shaft with electric power.

BLACK KETTLE COPPER CO.

TEXAS

Lands are in the Quitman mountains, south of Sierra Blanca. Exploratory work was begun Sept., 1909.

BLACK PRINCE COPPER CO.

ARIZONA

Office: 440 Gas & Electric Bldg., Denver, Colo. Mine office: Johnson, Cochise Co., Ariz. Robt. N. Bell, pres. and gen. mgr., Denver, Colo.; John C. Thompson, vice-pres.; Julia B. Wright, sec.-treas.; preceding officers, Robt. Temple and Richard McKnight, directors. Organized May 10, 1901, under laws of Arizona, capitalization \$1,500,000, shares \$1 par; issued, 1,134,500 shares. Annual meeting, last Wednesday in May.

Lands adjoin Peabody mine and comprise 8 claims, patented, area 147 acres, showing contact deposits in limestone, near porphyry. Mine has a 937' two-compartment shaft, sunk in limestone and showing copper oxides and carbonates, bornite and chalcopryrite below 850'. Small smelter shipments, 1907, returned 12% copper and 20 to 30 oz. silver per ton, and 1909 shipments returned 20 to 27% copper, with silver values. Shipments for 1912, 512,327 tons. Average values, copper \$8.759, silver \$4.903 per ton, according to the company's secretary. Local information to effect that leasing was being done on property in March, 1913, and that diamond drilling was contemplated. In 1911 U. S. Investor cautions investors against buying stock. Equipment includes a 15-h. p. hoist and 3 mine buildings.

BLACK RANGE TUNNEL & MINING CO.

NEW MEXICO

E. D. Randolph, gen. mgr., Lafayette, Ind.; C. B. Hullinger, supt., Chloride, Sierra Co., N. M. Company presumably a reorganization of the Black Range Copper Mining Co. and Black Range Reduction Co. (see Vol. X), both now dead. Property, the Silver Monument mine, showing a vein of silver-copper ore.

Development includes a 2,300' tunnel and a shaft. Equipped with steam plant, Rand compressor and a 25-ton concentration mill.

BLACK ROCK MINE.

MONTANA

Owned by Butte & Superior Copper Co., at Butte, Mont.

BLACK ROCK MINE.

Office: 524 Main St., Racine, Wis. Mine office: Yerington, Lyon Co., Nev. Property privately owned by Wm. D. Thompson of Racine, Wis., and E. H. Walker of Yerington, Nev. E. H. Walker, gen. mgr. Lands, 3 patented claims, area 52 acres, in Mason district, showing 4 parallel fissure veins in quartz-monzonite, of which 2, of 8 to 10' average width, traceable 2,500', have shafts of 40', 80' and 150', showing chrysocolla and chalcoppyrite, bot-tomed in ore estimated to average about 4% copper and 40 cts. to \$3 silver per ton. The 2 incline shafts of 80' and 150' were sunk in ore; the two 40' shafts are in granodiorite and dacite.

BLACK ROCK MINING CO.**ARIZONA**

Mine near Wickenburg, Maricopa Co., Ariz. Apparently dead. See Vol. X.

BLACK TRAVELER COPPER MINING CO.**MONTANA**

Office: Mullan, Idaho. Mine office: Saltese, Missoula Co., Mont. Oliver Roof, pres. and gen. mgr.; Chas. Bryant, vice-pres.; Thos. G. Kennedy, sec.-treas.; preceding officers and F. J. Luedke, directors. Lands, 8 claims 7 miles northeast of Saltese, near the Saltese Consolidated Copper Mining & Milling Co., showing 2 parallel veins, 1, of about 6' width, having a strong gossan. Development is by 2 crosscut tunnels, the upper cutting a vein of 12' estimated width, carrying copper ore, mainly chalcoppyrite, giving assays of about 3%, with richer streaks assaying up to 32.4% copper and 15.8 oz. silver, with traces of gold. The 1,200' lower tunnel is planned to be driven 1,800' to reach the vein, but cut a vein, 1913, showing 30" of ore as-saying 7.7% copper, and 100' drift east on this vein has been con-tracted for.

BLACK WARRIOR MINE.**ARIZONA**

At Black Warrior, Gila Co., Ariz. Bond and lease of Warrior Develop-ment Co., relinquished, 1912. Mine has been a heavy producer for several years past. See Warrior Development Co.

BLACKBURN MINES CO.**ALASKA**

Mine office: Copper Center, Copper River district, Alaska. Property, adjacent to Kennecott mine, shows high-grade copper glance as replace-ment of limestone, besides contact metamorphic deposits.

BLAINE & EMMETT MINING CO., LTD.**IDAHO**

At Murray, Shoshone Co., Idaho. Is a silver-lead mine, copper being incidental and not recoverable. Described Vol. X.

BLAKE MINING, MILLING & INVESTMENT CO.**NEW MEXICO**

Idle. Letters to office: Las Vegas, San Miguel Co., and Chapelle, San Miguel Co., N. M., unanswered. H. E. Blake, pres. and gen. mgr.; S. B. Davis, Jr., vice-pres.; B. C. Pittenger, sec.; C. P. Hammond, treas.; preced-ing officers and Jos. L. Matt, directors. Capitalization \$200,000. Lands, 140 acres, in the Mineral hill district, 12 miles from Las Vegas, slightly de-veloped by shafts and tunnels. A 14-ton sample ore shipment, yielded 2.1% copper. The reduction plant, 7 miles from the mine, doing a general cus-tom business, includes a mill and 50-ton Gardiner process leaching plant.

BLAND MINE.**ARIZONA**

T. M. Heck, owner; Jack Evans, mgr. Address: Patagonia, Santa Cruz Co. Mine in the Santa Rita mountains, Harshaw district, Ariz. Oper-ated several years in a small way and has 2,500' underground workings, including 600' tunnel. Property shows 12' vein with sulphide ore. A strike of rich ore was made July, 1913, and shipments made to Douglas smelter. Property formerly owned by Bland Mining Co. and is under option to M. A. Brickson.

BLEW BUR COPPER CO.**CALIFORNIA**

Office: Formerly at Salton, Riverside Co., Cal. Apparently dead. See Vol. X.

BLISTERED HORN MINE.**COLORADO**

Andrew Lejune, supt., Tin Cup, Gunnison Co., Colo. Property shows a vein of gold-silver-copper ore developed by tunnel work.

BLOCK MINES CO.**ARIZONA**

Ed. Block, sec.-treas.; Wickenburg, Maricopa Co., Ariz. Owns the Billy Boy and Christmas group of mines on the Hassayampa river, Yavapai county. Company organized Aug., 1913. No further information secured.

BLUE ACRE COPPER CO.**UTAH**

Office: Boston Bldg., Salt Lake City, Utah. W. H. Hess, pres. and gen. mgr.; F. J. Austin, C. A. Gillette, G. H. Davis and D. F. Brayton, directors, at last accounts. Capitalization \$600,000, shares \$1 par. Property, 17 claims, 320 acres, in the Star district, Beaver county, adjoining the O. K. property, showing 5 contact and fissure veins, of which 3 are being developed, these carrying values estimated by management to be 6% copper, 5 oz. silver and \$4 gold per ton from oxide, carbonate and sulphide ores, opened by 4 shallow shafts. Working in 1911.

BLUE BELL MINE.**ARIZONA**

Owned by Consolidated Arizona Smelting Co., at Humboldt, Yavapai Co., Ariz.

BLUE BELL MINE.**MONTANA**

Address: Blossburg, Powell Co., Mont. Property 1 mile southeast of west end of Mullan tunnel, shows 12' vein of garnet and epidote in monzonite carrying copper with molybdenite. Developed by a shaft and tunnel, 175' below collar of shaft. Idle, 1912.

BLUE BELL MINING CO.**CALIFORNIA**

Letters unclaimed at Quincy, Plumas Co., Cal. Apparently dead. See Vol. X.

BLUE BELL MINING & REDUCTION CO.**ARIZONA**

Mine P. O.: Swansea, Yuma Co., Ariz. W. P. Martin, pres.; E. T. Miner, vice-pres. and supt.; K. E. Newcomb, sec. Lands, 23 claims, about 5 miles from Swansea, just across the Bill William's Fork river from the Swansea pumping plant. Mine has a 200' two-compartment shaft, with 2 levels opened; and several hundred feet of tunnels, showing ore carrying up to 10% copper, with fair gold and silver values.

BLUE BIRD-CORBIN GOLD, SILVER & COPPER MINING CO.**MONTANA**

Address: Wickes P. O., Jefferson Co., Mont. Wm. Q. Ranft, owner and mgr. John W. Johns, supt. Property, about 4 miles west of Wickes, is one of the old mines of the district, taken over in 1911 together with the Penn Yan claim. Claims show 2 veins of 4 to 14' in width carrying ore shoots averaging 5% copper, 5% lead, 25 oz. silver and \$1.50 gold per ton. Ore occurs in a tourmalinized vein in andesite tuffs and diorite along a contact with a 50' wide dacite dike that forms the footwall.

Developed by 2,248' tunnel and 225' shaft with levels at 100' and 200'. Equipped with electrical power. Shipments were made in 1911 returning 3 to 5% copper with gold-silver values.

BLUE BULL MINE.**NEVADA**

Mine at Goldfield, Esmeralda Co., Nev. Geo. Wingfield, owner. K. M. Simpson, mgr.; C. C. Starr, asst. mgr. Property is a gold-silver mine in the Goldfield district, developed by a 700' shaft with workings on the 500' level cutting the Victor and Copper veins, the latter yielding 10 to 16%

copper ore. The 700' crosscut is being driven to cut the Victor vein, which is large and productive in the adjoining C. O. D. Consolidated mine.

BLUE JACKET COPPER CO., LTD.

IDAHO

Office: 79 Milk St., Boston, Mass. Mine P. O.: Landore, Adams Co., Idaho. J. E. Stevens, pres.; F. H. Kleinschmidt, vice-pres.; A. F. Abbott, sec.-treas.; preceding officers, P. H. Miller, John O. Burque, A. J. Pitman and Edgar Hall, directors; P. H. Miller, gen. mgr., supt. and purch. agt. F. H. Kleinschmidt, mg. engr. and chemist-assayer. Organized Feb. 6, 1913, under laws of Idaho, capitalization \$1,000,000, shares \$5 par, fully paid; 200,000 shares issued. Annual meeting, third Tuesday in September.

Company has lease and bond on the Blue Jacket and Mountain Queen mines, comprising 1 claim and a fraction, covering 29 acres in the Seven Devils mining district. The ore is found in a contact metamorphic deposit between limestone and diorite. It consists of bornite with some copper glance in a garnet gangue. The deposit is said to be 75' wide, 1,200' long and proven to a depth of 300'.

Underground development is by 2 shafts of 125' and 300' depths and by various tunnels and crosscuts amounting to 6,000' in all. The mine has steam and gasoline power and a hoist. The Oregon Short Line railroad is about 17 miles from the property.

Production, 73,073 lbs. of copper in 1911 and 360,000 lbs. in 1912. The average grade treated in the latter year carried 31.27% copper, with 8 oz. silver and \$1.50 gold per ton. Is an exceptionally rich ore deposit which would be profitable if on a railroad.

BLUE JACKET MINING CO.

IDAHO

Office: Baltimore, Md. Mine P. O.: Lucile, Idaho Co., Idaho. W. B. Clark, pres.; B. N. Baker, vice-pres.; J. M. Lawford, sec.-treas.; preceding officers, F. T. Homer and Frank E. Johnesse, directors; F. E. Johnesse, gen. mgr. and supt. Company organized Oct. 20, 1908, under laws of Idaho, capitalization \$50,000, shares \$1 par, fully paid. Annual meeting, first Monday in January. Company is a close corporation. Seven claims, unpatented, about 132 acres, in Crooks Corral mining district, Idaho Co., Idaho.

Ore occurs as replacement along contact between diorite and andesite porphyry. Orebody is from 50 to 70' wide, runs east and west, and dips at an average angle of 35°. It has been opened up by a 300' shaft, numerous tunnels, crosscuts and drifts, aggregating 3,395'. These workings block out 33,000 tons of ore, carrying 3.7% copper with 1.5 oz. silver and \$1.80 gold per ton. The orebody is more or less oxidized down to the 700' level, though the greater part of the ore in the lower levels is original sulphide and the enriched portion lies between the 1st and 4th levels. Reserves estimated at 542,000 tons. Property has no mill, hoist nor reduction plant of any kind and has been closed down since 1909 awaiting railroad transportation which is now 40 miles away. Property is a good one and officers able and responsible.

BLUE JAY MINE.

MONTANA

Owned by Anaconda Copper Mining Co., at Butte, Silver Bow Co., Mont.

BLUE JAY MINE.

NEVADA

Mine office: Yerington, Lyon Co., Nev. A. Sommers, supt. Developed by shaft with drifts extended on 200' and 400' levels, 1913. Equipped with steam power and a 30-h. p. gasoline hoist. Reported sold, Aug., 1913, to Mason Valley Mines Co.

BLUE JIM MINING CO.

WASHINGTON

J. M. Birks, sec., Spokane, Wash. Mine office: Ione, Stevens Co., Wash. C. S. Clute, gen. mgr. Organized July 1, 1909, under laws of Wash-

ington. Lands, 5 claims, across the Pend d'Oreille river, and about 5 miles from Ione, and 1 mile northeast of Box canyon, said to have a fair surface showing of copper, with a vein variously reported as 4 to 12' in width at surface. Development includes some opencuts, a shallow shaft and a 215' crosscut tunnel, showing ore giving fair copper assays, with a little silver and gold. Lower tunnel started in 1912. Company doing assessment work only, 1912.

BLUE LEAD CO.

ARIZONA

Address: Superintendent, Blue Lead Co., Benson, Cochise Co., Ariz. Property, the Blue Lead mine on northern side of Santa Rita mountains, southwest of Benson. Has made regular shipments since Oct., 1912.

BLUE LEDGE MINE.

CALIFORNIA

Mine at Hutton, Siskiyou Co., Cal. Frank H. Carnahan, supt., at last accounts. Purchased from R. S. Towne in 1913 by H. C. Russell and associates of Marquette, Mich. Property, 27 claims, patented, about 440 acres in the Blue Ledge district on Upper Applegate river, 4 miles south of the Oregon line, also a large smelter site at Seattle Bar. Property located 1889, but only slightly developed until 1909. Mr. Towne has spent over \$700,000 in work since that time.

The vein, with strike of N. 10° E., and almost vertical dip, slightly inclined west, traceable some 8,000' by prominent outcrops of 50 to 250' width, lies between a footwall of gray to black, slightly micaceous schist, and a hanging wall of soft white mica-schist, the walls not always being clearly defined, and with mineralization extending into the hanging wall. Orebodies are lenticular deposits, with clay gouge, said, by several authorities, to be in huge laminations in the schist formation, but ore apparently is persistent to depth. Ore is mainly chalcopyrite, associated with a little sphalerite and occasional native copper. The mine has 9 tunnels, with upwards of 2 miles of workings, blocking out considerable ore, and nearly 7,000' of diamond drilling showed several orebodies, said to give average assays of 5% copper, 2.5 oz. silver and \$2.50 gold per ton.

Equipment includes a hydro-electric power plant, taking water from Elliot creek under a head of about 150', at pressure of 85 lbs. Buildings include an office, assay office, boarding house, dwellings and sawmill. The company has improved the town site with waterworks, sewers and a school house, and has built a good road between Hutton and Yreka. A 40-mile railway to connect with the Southern Pacific, at Medford, Ore., has been projected. Property is in strong hands, and likely to become an important producer as soon as the railway line to the mine is built.

BLUE LIGHT COPPER CO.

NEVADA

Address: care C. W. Marsh, pres., Washington, D. C. Mine office: Mina, Mineral Co., Nev. Henry L. Dollman, vice-pres.; F. M. Baker, Carson City, Nev., sec.; Wm. C. Osborne, treas.; preceding officers, Chas. N. Van Cleave, Chas. E. Test and Richard Stegemeier, directors. Organized Oct., 1907, under laws of Nevada, capitalization \$2,500,000, shares \$1 par, nonassessable, as successor of Blue Light Mining Co.

Lands, 24 claims, area 480 acres, about 12 miles from Mina, in the Gold Mountain district, also 3 lots in Mina. Mine has shafts of 60', 70' and 700', developing an 8' vein of auriferous and argentiferous sulphide ore assaying about 5% copper, with 4,406' of workings, estimated by management to give 100,000 tons of ore blocked out for stoping. Equipment includes 30-h. p. and 100-h. p. gasoline hoists, latter said to be good for 3,000' depth. Five carloads of ore shipped, 1907, returned 15 to 23.2% copper, with small gold and silver values. Examined, 1913, by R. W. Hadden.

BLUE LIGHT MINE.**NEVADA**

Superintendent's address: Mina, Nev. Property, 14 miles from Mina, consists of a group of claims developed by 600' shaft from which several carloads of rich carbonate ore has been shipped. Shaft has just reached sulphide zone, but workings have not yet passed through leached material. Mine is equipped with hoist, buildings, etc., and appears to have earmarks of a mine.

BLUE MOUNTAIN MINING CO.**OREGON**

Sec.-treas. and office: Joseph Grever, 17 Thoms Bldg., Cincinnati, Ohio. Mine office: Sumpter, Baker Co., Ore. Works office: Cable Cove, Grant Co., Ore. C. L. Arzeno, pres., gen. mgr. and purch. agt.; Dr. T. B. Mulloy, vice-pres.; preceding officers, F. H. Cloud, Wm. G. Parrot, Norton Stutson, Frank Gerwin, B. J. Stagge and Chas. Neblett, directors. Calvin Haines, supt.; G. W. Hewitt, mill supt.; C. A. Braunger, chemist-assayer. Organized under laws of Arizona, capitalization \$2,000,000, shares \$1 par, fully paid and nonassessable; about 1,400,000 shares issued. Authorized \$50,000 6% bonds. Annual meeting, May 17. Property, 27 claims, approximately 500 acres, 200 patented and said to be covered with timber with the exception of 35 acres, situated in Cable Cove district.

Ore bodies are said to be fissure veins in diorite, running slightly east of north and dipping in opposite directions. One vein has an average width of 4', a proven length of 2,200' and a proven depth of 700'. The Eagle vein is said to be 60' wide and developed for 6,800' in length. The concentrates carry 11 oz. silver and \$53 in gold per ton. The ore carries less than 1% copper, traces of lead and 3% zinc.

Development is mainly by tunnels, of which there are 8, the longest being 1,900' on the McKee claim. The Chance and Cloud shafts are 115' and 18' deep respectively. There is a total of 7,000' of underground workings and the management estimates 40,000 tons of ore blocked out.

The property is equipped with a 120-h. p. steam plant with 1 hoist good for 500', 1 six-drill compressor and all necessary mine buildings. A stamp mill is being installed, equipped with gyratory and Dodge crushers, 20 steam stamps, Huntington mill, four 5x12' plates, 4 Wilfley tables and 8 Johnson tables. There is also a 10-ton test mill which has been running regularly for some time. The property is 12 miles from the Sumpter Valley railroad. The crude ore averages \$10 per ton.

BLUE RIDGE COPPER CO., INC.**VIRGINIA**

Office: 613-145 La Salle St., Chicago. Mine office: Stanley, Madison Co., Va. Jacob Lauth, pres.; Frank L. Race, sec.-treas.; Geo. F. Brigham, Jr., gen. mgr. Organized April 2, 1904, under laws of Virginia, capitalization \$500,000, shares \$5 par. Lands, 100 acres, on the eastern slope of the Blue Ridge mountains, in one of the deepest and most inaccessible ravines of the range, about 8 miles from a railway, opened by old pits and a 200' shaft, with about 500' of workings. Ore is variously reported as a contact vein between granite and metamorphosed slate, and as an 8' bed of greenstone, carrying native copper, cuprite, malachite and azurite. Has a 4' Pelton wheel, using water under a head of 500', generating 350 h. p. Has necessary mine buildings, and a 50-ton Nissen mill. Presumably idle since Aug., 1909.

BLUE RIDGE MINING CO.**ARIZONA**

Situated near Constellation, Yavapai Co., 15 miles from Wickenburg. Claims show a large ledge crossing the Hassayampa river, carrying carbonate ores which company expects to treat in a 40-ton concentrating mill, finished in Aug., 1913. Mill contains Sturtevant crusher, a 5' Bryan mill, Deister slime and sand tables, leaching tanks and precipitation well.

BLUE VEIN COPPER MINING CO.**MONTANA**

Office and mine: 17 Owsley Blk., Butte, Silver Bow Co., Mont. F. L. Melcher, pres.; Lewis A. Smith, sec.; W. F. Noyes, treas. Organized June 21, 1906, under laws of Montana, capitalization \$1,000,000, shares \$1 par. Lands, 9 claims, patented, being the Little Boulder, Valentine, Bunker Hill, Blue Vein, Blue Vein No. 1, Myrahl, North Star No. 1, the Ozone and Columbia lode claims in the southern part of the Butte district. Idle since Nov., 1909.

BLUE WING MINING CO.**NORTH CAROLINA**

Office: 35 Congress St., Boston, Mass. Operating office: Virgilina, Va. F. E. Wood, pres.; T. M. Russ, vice-pres.; D. M. Hill, sec.; J. P. Sylvester, treas.; Robt. G. Lassiter, gen. mgr. Organized 1907, under laws of West Virginia, capitalization \$100,000, shares \$1 par, nonassessable. Property in the Virgilina copper belt, Granville and Person counties, N. C.

Lands comprise 1,488 acres, showing a 4' fissure vein in schist, with north and south strike, traceable 1 mile, and proven to depth of 350', estimated by management to carry ore averaging 3% copper, 1 oz. silver and 10 to 20 cts., gold per ton. Ore is highly silicious, and difficult of treatment without admixture of basic ores, which are unobtainable in the district. Development is by shafts of 75' and 350', with 4 levels opened, the ore showing bornite and glance with quartz and occasional calcite gangue.

Equipment includes a 40-h. p. hoist, good for 500', one 5-drill straight-line air compressor and 7 power drills. Buildings include engine house, boiler house, ore-sorting shed with picking belt, and carpenter shop. Production, 1909, was 2,900 tons of ore, yielding 157,057 lbs. fine copper. Mine very poorly operated in the past, owing chiefly to lack of working capital and proper equipment for operating on a big scale. All ore mined thus far has been hand-sorted and shipped to smelters. Property valuable and with fine crushing and concentration by flotation process could be profitably operated. Mine leased March, 1913, to S. Durgy of New Haven and has been unwatered.

BLUESTONE MINING & SMELTING CO.**NEVADA**

Office: 43 Exchange Place, New York. Mine office: Yerington, Lyon Co., Nev. Capt. J. R. DeLamar, owner; W. O. Fletcher, sec.; Chas. A. Week, supt. Is not incorporated.

Owens the Bluestone mine and a group of 20 claims adjoining the Mason Valley mine. The Bluestone is the oldest property in the district, claims having been patented previous to 1890. Mine has been opened to a depth of 540' and has about 6,500' of workings, including a 1,300' main haulage tunnel, cutting an ore shoot about 300' wide and 500' long at a point 300' below the apex. This shoot is said to carry an 80' paystreak of high-grade ore, ranging up to 20% in tenor, with balance of ore carrying 2.5% copper. Management estimates 1,600,000 tons of ore in sight, averaging 2.6% copper. Ore is mainly chalcoppyrite, associated with considerable epidote, in a garnet-limestone gangue, there being practically no oxidized ores, even at the outcrop. Ore is uniform in character, and after a light roast is well adapted to magnetic separation. Drill holes prove that ores extend to 750' depth.

Equipment includes a 50-h. p. hoist and a 35-drill electric air compressor. A 100-ton mill pulverizes the ore, in rolls, to pass an 8-mesh screen, after which ore is slightly calcined in a tower roaster, to magnetize the pyrite. Roasted ore is then passed through a Wetherill magnetic separator, which takes up the mineral, and discharges the waste, giving a concentrate of about 15% copper. Magnetic separation is claimed to have given a 95% extraction, though 85%, under working conditions, will be satisfactory.

The magnetic concentrating plant is reported running and the furnace has been enlarged. Company has spent \$250,000 in development and equipment of property. Management is able and property considered valuable.

**BOCA; CIA. EXPLORADORA Y EXPLOTADORA
DE LAS MINAS DE LA.**

MEXICO

Mine office: Ciudad La Victoria, Rio Grande, Coahuila, Mex. Antonio Quintana, pres. and gen. mgr.; C. Guerra Espinosa, sec., at last reports. Organized 1905, under laws of Mexico, capitalization 30,000 pesos; issued, 18,750 pesos. Lands, 101 hectares, including the Bornita, Asturiana, Esperanza and Oviedo mines. Development is by a 44-meter shaft, and by tunnels of 26, 44, 58 and 100 meters, showing considerable ore, of which a portion is high grade. Mines produce about 1 carload bi-monthly of ore assaying about 20% copper, 800 grams silver and 3 grams gold per metric ton. Property has a water power available. Idle owing to revolution.

BOCA DEL COBRE MINING CO.

MEXICO

Letters unclaimed at San Luis del Cordero, Durango, Mex. Capt. C. Henry Thompson, pres.; J. D. Thompson, vice-pres., 481 So. Orange Grove Ave., Pasadena, Cal.; Lane C. Gilliam, gen. mgr.; A. G. Alexander, mgr.; Nelson Nyberg, supt.; Pasadena National Bank, treas. Organized 1906.

Lands, 188 hectares, 25 miles from Nazas and 45 from Pedricena, said to have been bought for \$300,000, including El Rosario group of 12 hectares, San Nicolas, San Francisco, and Santa Rita mines, all with considerable development, ore reserves being valued at 12,000,000 pesos. The Santa Rita mine, 900' deep, has a 75-h. p. hoist. El Rosario mine gave average assays from ore shipped from 4th and 5th levels, of 7.5% copper and 100 oz. silver per ton, with small gold values.

Equipment includes electric power, 2 hoists and a 12-drill air compressor. Ore is transported by traction engines from the mines to Bermejillo station. Property was a shipper, 1907-09, and is said to have earned good profits. Mine considered valuable and management good. Idle several years and region rent by revolution.

BOHEMIA MINING CO.

MICHIGAN

Office: 85 Devonshire St., Boston, Mass. Mine office: Lake Mine, Ontonagon Co., Mich. Operating office: Dee Bldg., Houghton, Mich. Wm. A. Paine, pres.; Chas. A. Snow, vice-pres.; Robt. H. Gross, sec.-treas.; preceding officers, John H. Rice, Thos. S. Dee, Richard M. Edwards and F. Ward Paine, directors. Organized Jan. 29, 1910, capitalization \$2,500,000, shares \$25 par, assessable; paid in, \$8; issued, \$1,875,000. Of the 75,000 shares issued, 30,000 were given for lands, and 45,000 were sold to the public, at \$8. Boston Safe Deposit & Trust Co., transfer agent. Stock is listed on the Boston curb. Annual meeting, third Wednesday in April.

Lands, 960 acres, originally known as the Piscataqua, in very early days, and later as the Henwood. It is hoped that the property is traversed by the cupriferous amygdaloidal bed of the Lake Copper Co. Diamond drilling was done, 1910, with 2 drills working at the end of the year. Drill holes have yielded a number of cores, from various amygdaloidal beds, more or less cupriferous, some with copper in fair quantities, but with nothing remarkably promising or that justify sinking a shaft. Suspended operations March, 1911.

Annual report, Feb., 1913, shows cash in bank, \$125,193, and states that as soon as sufficiently important developments are made on adjoining properties, they will resume development work.

BOLEO; COMPAGNIE DE.**MEXICO**

Secretary and office: M. Georges Odier, 56 Rue de Province, Paris, France. Mine at Santa Rosalia, Sur, Baja California, Mex. M. A. Mirabaud, pres.; Charles La Forge, managing director; Jules Aron, William d'Eichtal, Maurice Ephrussi, Marquis de Montaigu, Henri Puerari, Ernest Tambour, Charles de Wendel, directors. Ernest Michot, director-general; M. Michel Berger and André d'Eichtal auditors.

Organized May 16, 1885, under laws of France, capitalization f12,000,000, shares f100 par. There are also 46,000 founders' shares. Is controlled jointly by the French house of Rothschild and the Banque Mirabaud, and owns a considerable share interest in the Compagnie d'Inguaran. Is exempt, until Dec. 17, 1925, from all federal and local taxes, except stamp taxes; is exempt, until 1935, from export and import duties on fuel consumed; is exempt, until 1942, from custom duties and local duties, and employees are exempt from military and civil service.

The profit for 1912 was \$1,414,024, compared with \$771,246, in 1911. After allowing for amortization and general reserve, a dividend of 8%, or \$7.20 per share was declared. Accounts for year to Dec. 31, 1912, submitted April 26, 1913, showed a credit balance of 6,223,068 francs. Reserve fund 7,070,120 francs.

Dividends have been as follows: f62.5 in 1901; f62.5 in 1902; f104.16 in 1903; f135.41 in 1904; f200 in 1905; f312.5 in 1906; f200 in 1907; f25 in 1911 and f36 in 1912 with f34.1 for founders' shares.

Company owned 11 groups of copper claims, 20,000 hectares, granted by the Mexican government, also 11,920 hectares of grazing lands south of the mines. Principal groups are the Soledad, Providencia and Purgatorio. Lands include 5 known copper deposits of importance, the copper-bearing formation covering 3,000 hectares, with possibilities of further extensions.

The ore occurs in a formation of Tertiary conglomerates, sandstones and tuffs, the cupriferous tuffs overlying conglomerates of eruptive rock pebbles, and being surmounted by argillaceous tuffs, all traversed by fissures. The ores comprise a remarkably varied series of oxidized copper minerals in which the metal occurs in combination with silver, lead, cobalt, manganese and other metals. The prevailing oxide is melaconite, more or less mixed with manganese and iron oxides; and the prevailing sulphides below water level are covellite and copper glance. The following rare minerals are peculiar to this deposit: Boleite, an oxychloride of lead, copper and silver; cumengeite, oxychloride of lead and copper; fergusonite, a chloro-carbonate of lead; sphaerocobaltite, a carbonate of cobalt. Practically every known oxidized ore of copper occurs here, as well as those of lead, manganese and iron. Gypsum is abundant and native sulphur occurs. All minerals occur in an unctuous, decomposed tuff, locally called soap-clay. There are 3 cupriferous beds, the upper averaging about 3' in thickness, the middle 2 to 3', and the bottom 2 to 10'. The middle bed carries oxide and carbonate ores in oolitic concretions, known locally as boleos, hence the name of the mine. The lowest bed, partly below the water line, carries sulphide ores, as well as oxides and carbonates. This bed, No. 3, has been the chief source of ore supply of the property. It has averaged 1 meter in thickness, but varies from a few inches up to 16' in different parts of the property. The ore is disseminated through the tuffs in thin, irregular veins, with clay gouge, and has a marked concentration toward the bottom of each bed, where the ore forms compact layers of 6 to 12". The main workings are 15 to 200 meters above sea level, the mine being opened by numerous tunnels, and by 7 shafts of the following depths: Sombrero, 98 meters; Carmen, 53 m.; Purgatorio, 55 m.; Central, 156 m.; Amelia, 48 m.;

Santa Rita, 86 m.; San Juan, 86 m. The mine is extensively developed, bed No. 3 having 365 kilometers of workings in 1912.

Owing to the peculiar nature of the mine, all drilling is done by hand, and the ore, not being fitted for mechanical concentration, is hand-sorted, and about half is machine-briquetted at a cost of only about f0.8 per ton, the argillaceous gangue serving as a natural binder. Average net returns from ore smelted have ranged from 4.29% copper in 1900, to 3.36% in 1906, when the high price of copper caused the smelting of ore of lower than average grade.

The mine has complete steam and electric plants, generating upwards of 2,500 h. p. from steam engines, of which 2,000 h. p. is transformed by two 500-kw. 3-phase current generators and two 250-kw. 3-phase generators. The electric plant, at Santa Rosalia, furnishes power for hoisting, traction engines and a lighting system having 50 arc lights and a number of incandescent lamps. The company is courageous in installing new machinery, and has a "boneyard" containing much old machinery that has been scrapped. The climate is tropical, and the country extremely arid. Potable water is brought from a reservoir on the Yaqui plateau, through a 16,074-meter pipe line, having pumps at Santa Agueda and Santa Rita. The mines and works are connected by a 30-kilometer private railway, equipped with 9 locomotives and 250 cars.

The smelter, rebuilt 1901 and 1906, has 12 water-jacket blast furnaces, of 200 to 250 tons daily capacity each, 6 with 12 and 6 with 15 tuyeres each. There are 6 large Root blowers, driven by three 175-h. p. compound engines. Sea water for jackets is supplied by a duplex pump of 2,400 cubic meters hourly capacity, operated by a 250-h. p. engine. Electric locomotives on the slag line dump molten slags into moulds in rough holes in the ground, and, after cooling, the masses of slag are dumped over the end of the breakwater, serving a useful purpose in its extension. Fuel for smelting is German coke and English coal, and patented coal briquettes are used for general fuel. The first fusion product is a matte of 60 to 65% copper tenor, blown up to black copper of 93 to 94% average tenor, production being about two-thirds matte and one-third black copper. Matte and bars are shipped to England and France for refining, the management believing this preferable to adding a converter plant.

The works at Santa Rosalia include a 2-story power building, of steel, concrete and brick, and extensive machine shops, capable of handling all classes of mining work, the company occupying a singularly isolated position.

The harbor of Santa Rosalia has breakwaters of 650' and 2,500', with a 340-meter jetty and 2 new wharves, the dock having an area of 15 hectares, with breakwaters composed of large blocks of slag. The harbor works include a dredge and three 200-ton lighters used therewith. The port handles annually about 125,000 tons of freight, in addition to about 7,000,000' of lumber. The company owns a steamer, plying between Santa Rosalia and the eastern coast of Mexico. Copper is shipped to Europe on the steamers of the *Compagnie Chargeurs Reunis*.

The town of Santa Rosalia has a population of 9,500, of whom 200 are Europeans, dependent solely upon the mines and works, and is controlled absolutely by the company. The town is well laid out, and has 4 general stores, warehouses, saw mill, church, 4 school houses, theater, amphitheater and market. The company gives free medical and surgical attendance, medicines and an excellent hospital service to employees.

The labor question has given considerable difficulty, owing to the scant population of Lower California, necessitating the importation of workmen.

Wages average about 2 pesos daily for miners. The importation of 500 Japanese workmen, 1904, proved unprofitable, only 40 men remaining at the mine by the end of the year, and tropical labor from Tepic also proved a failure. A large number of Chinese coolies were hired, 1903-04, but of the force of men now employed, only about 300 are Chinese.

In 1912 the company employed 3,000 men in their mines. Almost all hand labor is Mexican with some Yaqui Indians. Europeans are only employed as foremen and for special work.

Recent production has been as follows: 304,940 metric tons of ore, yielding 22,817,610 lbs. fine copper in 1906; 319,854 tons, yielding 24,530,000 lbs. in 1907; 342,334 tons, yielding 22,619,196 lbs. in 1908; 328,100 tons, yielding 31,416,550 lbs. in 1909; 29,120,000 lbs. in 1910; 27,686,400 lbs. in 1911 and 28,336,000 lbs. in 1912. The production of ore mined for 1911 was 355,100 tons of 3.47% ore, and 364,850 tons of 3.51% ore in 1912. The smelter handled 356,700 tons of ore in 1911 and 360,000 tons of ore, yielding 12,650 tons of copper in 1912, an increase of 290 tons over the preceding year. The average content of the ore was 3.5%. Railway transported 652,312 tons in 1912, as against 605,661 tons, in 1911. Reserves of ore amount to 6 years' supply.

The total production of copper to the end of 1912 was 242,088 metric tons. The property is one of exceptional merit and has been ably managed for many years.

BOLINAS COPPER MINING CO.

CALIFORNIA

Letter unclaimed at Bolinas, Marin Co., Cal. T. P. H. Whitelaw, pres. and mgr., at last accounts. Lands, 4 miles east of Bolinas, show several narrow veins in serpentine, on which some development work was done in the past, including a 180' shaft, on the western vein, having levels at 100' and 180', with about 2 miles of workings. Ore on dumps is said to carry 5 to 10% copper. The property has a good equipment, including a mill, but has been idle some years and is apparently moribund.

BOLSTER MINING CO.

WASHINGTON

Property, 11 claims on Copper mountain, near Chesaw, Okanogan Co., Wash., formerly belonged to Monterey Mining Co. Has been worked by shafts and a 500' tunnel for past 12 years.

BON SOLDAT MINING CO.

UTAH

Letters unclaimed at 647 West Forty-first Place, Los Angeles, Cal., and Frisco, Beaver Co., Utah. Edith Maida Cook, pres.; Col. J. Lee Burton, vice-pres.; Dr. J. H. Dennison Cook, sec.; Farmers & Merchants Bank, Los Angeles, treas., at last accounts. Organized June 4, 1907, under laws of Arizona, capitalization \$1,000,000, shares \$1 par, non-assessable. Lands, 7 claims, 3 fractional, 5 miles from a railroad, showing argentiferous lead, copper and zinc ores, developed by shafts of 100' and 112'.

BONANZA DE COBRE.

MEXICO

Property owned by Elenita Development Co., which holds title through Mexican corporation, Lomita Mining Co., S. A. Controlled by estate of late Col. L. W. Powell, Los Angeles, Cal. Mine adjoins the Calumet & Sonora ground on the west and is about 2 miles north of Cananea, Sonora, Mex.

BONANZA DEVELOPMENT CO.

COLORADO

J. Parker Whitney, president. Organized March, 1880, under laws of Colorado. Capitalization \$300,000. Up to Oct. 10, 1911, had paid \$1,425,000 in dividends, including 1 of \$3.50 per share from the sale of the Santa Rita mine, to the Chino Copper Co. for \$1,200,000, in June, 1909. Dividend No. 9 of 20 cts. a share, Oct. 19, 1911, was derived from sale of the Baca grant No. 1, Bernalillo county, N. M., for \$57,126.

Owens 16,341 acres in Cochiti grant, Sandoval county, N. M.; 4 patented full mining claims in Gunnison county, Colo., and a half interest in the Excelsior mining claim, Lake county, Colo.

BONANZA MINE.

ALASKA

The Bonanza mine, Copper river, Alaska, is owned by the Kennecott Mines Co.

BONANZA MINE.

ALASKA

The Bonanza mine at Latouche, Latouche island, Alaska, is owned by the Beatson Copper Co.

BONANZA MINE.

IDAHO

At Montpelier, Bear Lake Co., Idaho, on O. S. L. R. R. Property, 4 miles from Montpelier, comprises several claims covering an area of Triassic "Red Beds" with low disseminations of copper. Workings have large flow of water which operating company plans to use in precipitation plant.

BONANZA MINING CO.

IDAHO

Office and mine: Montpelier, Bear Co., Idaho. Col. E. J. Parrish, pres.; E. M. Stewart, vice-pres.; A. D. Young, sec.; H. H. Hoff, treas.; preceding officers, Chas. Sweet, M. F. Whitman and Ira Chaffin, directors; R. C. Eckloff, gen. mgr., at last accounts. Organized Nov., 1905, under laws of Idaho, capitalization \$5,000,000, shares \$1 par, as successor of Montpelier Copper Mining & Smelting Co.

Lands, 25 claims, unpatented, area 500 acres, 9 miles southwest of Montpelier, including the Duke, Emerald and other claims. The Duke claim has a vein of 30' width, with paystreak of about 5', carrying auriferous and argentiferous copper ore, developed by a 400' shaft. Presumably idle.

In 1911 company's prospectus states: "Lands of the company extend over 4 miles of a large copper lead paralleled by a phonolite-porphry dike which extends from wall to wall 600', in which the copper ledge is embedded and can be seen and traced for the full distance of the property."

BONANZA MINING CO.

MEXICO

Office: Sunbury, Pa. Mine office: Ameca, Jalisco, Mex. Geo. B. M. Metzger, pres.; Chas. A. Sidler, sec.-treas.; E. J. Callahan, gen. mgr. Organized 1905, by shareholders of Amparo Mining Co., to take over the Barranca mine, bought for \$30,000. Idle since Nov., 1907.

BONANZA MINING CO.

MEXICO

Is the operating Mexican corporation of the Superior Bonanza Mining Co., which see. Holds title to the mineral properties of that company, located near Imuris, Sonora, Mex., consisting of 197 pertenencias, or approximately 490 acres. J. S. Douglas, pres.; Wm. Gmahling, vice-pres.; George Young, sec.; J. V. Montague, treas. Controlled through stock ownership by Greene Cananea Copper Co.

BONANZA MINING CO.

NEVADA

Mine office: Winnemucca, Humboldt Co., Nev. Company controlled by Chas. Baagoe and D. F. Shiveley of Winnemucca. Property, 5 miles from Winnemucca, on mountain of that name, shows vein in metamorphosed mesa slates intruded by diorite. A "strike" of ore, made in 1912, resulted in a lawsuit over ownership, settled Aug., 1913.

BONANZA MINING & DEVELOPMENT CO.

CALIFORNIA

Letters unclaimed at Vontrigger, San Bernardino Co., Cal. A. Wm. Grant, director; B. E. Webster, mgr., at last accounts. Organized Oct., 1909, under laws of California, capitalization \$500,000. Mine, developed by shaft, shows auriferous and argentiferous copper and tungsten ore. Has gasoline power. Presumably idle.

BONANZA MOUNTAIN COPPER CO.

MONTANA

Mine office: Florence, Ravalli Co., Mont. Amos Buck, pres.; G. W.

Dougherty, vice-pres.; H. C. Topping, sec., Wallace, Idaho; Thos. McCabe, treas.; preceding officers and D. J. Whaley, directors. Organized May 20, 1909, under laws of Idaho, capitalization \$1,500,000, shares \$1 par. Annual meeting, May 20, yearly.

Lands, 6 claims, unpatented, area 120 acres, in the Woodchuck district, about 3 miles from the Northern Pacific railroad, carrying 4 fissure veins, in quartzite and slate, of which 1 vein, dipping to the northeast, of 4' estimated average width and traceable 3,000', carries cuprite, melaconite, malachite, azurite, bornite, chalcopyrite and enargite, developed by a 300' tunnel. A test shipment of 2 carloads of ore returned 32% copper, 3 oz. silver and \$3.50 gold per ton. A crosscut tunnel is said to show a 6' ledge with stringers of ore from 1 to 5" wide, carrying good copper and silver values. An assessment of 1 mill per share was levied on several occasions.

BONANZA QUEEN MINING CO., LTD.

WASHINGTON

Office: 2931 Portland Ave., Minneapolis, Minn. Mine near Silverton, Snohomish Co., Wash. Elgin R. Shepard, pres.; W. R. Edwards, vice-pres.; C. F. Gordon, sec.-treas.; Angus Sutherland, gen. mgr.; preceding officers, P. D. Boutell, H. F. Warner and Mrs. S. L. Webb, directors. Organized 1902, under laws of Washington, capitalization \$2,000,000, shares \$1 par, nonassessable; fully issued. Bonds, \$250,000 authorized, \$190,000 issued, at 7%.

Property, 19 claims, showing 4 veins, said to be proven by gorges for about 4,000', the main vein being claimed to average about 60' width. Development by a 1,500' crosscut tunnel, 600' upraise, 100' drift on 300' level and 375' crosscut on 600' level, cutting orebody. Company also has 82 placer claims containing a 30' bed of clay, said to be suitable for Portland cement, also fire clay. Shipments of 26 carloads of ore to the Tacoma smelter gave returns of \$16.80 per ton. Management estimates 800,000 tons of ore averaging 5 to 6% copper, \$1 to \$6 gold per ton, which is too high. Mine is for sale as present owners lack necessary capital.

BONNEY MINING CO.

ARIZONA

Mine on upper Lynx creek, Yavapai Co., Ariz., is an old one recently reopened. The new shaft, 123' deep, Jan., 1913, will be carried down to 250', when drifting, to cut the face of the main tunnel 500' distant, will begin. The ores, formerly gold-silver, are now high-grade copper, in a vein 26" wide at 123' in depth.

BONNEY MINING CO.

NEW MEXICO

O. Ryback, Lordsburg, Grant Co., N. M., manager at last accounts. Property is the Bonnie mine in the Pyramid district, 5½ miles south of Lordsburg. Ore is silicious with chalcopyrite, carrying gold values found in 5 fissure veins in andesite forming the hills at the northern end of the Pyramid mountains, at an elevation of 4,500 to 5,500'. Main shaft is 300' deep with 3 levels, said to show veins 5 to 15' wide.

Veins of district, according to U. S. Geological Survey, are narrow and characterized by quartz with plentiful barite, rhodochrosite and other carbonates and carry ore in bands and bunches in central part of quartz. Wide silicious zones occur but are barren. Values considered superficial by authorities.

Property equipped, 1910, with 10-ton Partridge hot-blast smelter, which partly accounts for the present condition of mine, since no sane man would expect to operate profitably with this tea-pot smelter.

BORDER MINES CO.

ARIZONA

Todd C. Woodworth, business mgr.; James R. Hendra, gen. supt., Oro Blanco, Santa Cruz Co., Ariz. Company had a lease on the Austerlitz mine, which expired 1912, property reverting to A. H. Noon, owner.

BOREN GULCH MINING CO.**COLORADO**

Office: care Henry C. Deeming, gen. mgr., 15 No. Third St., Harrisburg, Pa. Mine office: La Plata, La Plata Co., Colo. G. C. Cornell, supt. Ores are complex auriferous and argentiferous copper, lead and zinc sulphides. Has steam power. The manager reports that only development work has been done, 1912-13, but as neighboring properties are resuming work and arranging to ship, this company may do so also.

BORNITE COPPER & GOLD MINING CO.**WASHINGTON**

Office: Bangor, Me. Mine office: Darrington, Snohomish Co., Wash. C. W. Coffin, pres.; Wilbur E. Frank, sec.; Hon. C. G. Austin, gen. mgr., at last accounts. Organized under laws of Washington, capitalization \$2,500,000, shares \$1 par. Lands, 11 claims, in the Stillaguamish district, showing strong outcrops of auriferous and argentiferous bornite and chalcopyrite. Development is by a 2,689' tunnel, cutting 3 veins. Has water power, and is said to have an aerial tram. Idle, if not dead.

BORNITE MINING & SMELTING CO.**WASHINGTON**

M. C. King, sec., 403 Rookery Bldg., Spokane, Wash. Mine office: Newport, Stevens Co., Wash. A. Hohneck, pres.; Geo. Grass, vice-pres.; preceding officers and Wm. J. Adams, directors; Fred Hecker, supt. Capitalization, originally \$1,000,000, was increased, 1908, to \$1,300,000, shares \$1 par, and 700,000 preferred shares at \$1 par. Annual meeting, first Wednesday in June.

Lands, 225 acres, patented, about $4\frac{1}{2}$ miles north of Newport, on north side of the Pend d'Oreille river. Development includes a 30' shaft, showing 12 to 24" of high-grade copper ore, and an 800' tunnel. Two veins average 4' in width, are proved for 250' beneath outcrop and carry $3\frac{1}{2}$ ' bornite ore with 40% copper and \$7 gold per ton. Total underground workings 1,500'; 5,000 tons ore estimated in sight. Has 50-h. p. gasoline engine and air compressor. Mine one-half mile from Idaho and Washington Northern railroad.

BOSTON & ALTA COPPER CO.**MONTANA**

Mine office: Corbin, Jefferson Co., Mont. John Joyce, pres.; Marcus L. Hewett, vice-pres. and gen. mgr.; Chas. H. Innes, sec.-treas.; preceding officers, Walter Callender, Warren Curtis, Sr., Jas. G. Gregg, Archibald S. Spriggs, Wm. Tatham and Chas. B. Van Nostrand, directors; Richard M. Atwater, Jr., cons. engr.; C. E. Titus, supt. Organized Nov., 1909, under laws of West Virginia, capitalization \$3,000,000, shares \$10 par, as successor of Alta-Montana Copper Co. to take over and work the Alta mine, whose output of \$32,000,000 has made it one of the big mines of the world.

The Alta mine, passing from the original owners to the Helena Mining & Reduction Co., was shut down, 1903, and thereafter was worked occasionally, by tributers, until recently. The Alta Montana Co. succeeded to the ownership, and was succeeded in turn by the Kelly Mining & Reduction Co., which was succeeded by the Alta-Montana Copper Co., which was succeeded by the Boston & Alta Copper Co. The New Mexican holdings of the Kelly Smelting & Refining Co. were segregated, holdings of present company being exclusively in Montana.

Lands, 640 acres, including the Alta group of 8 claims, carrying about 7,000' of the Alta or mother lode of the Corbin camp, property including some placer ground near Corbin, and a townsite. The Alta lode consists of fissures in granite, with dip to the north, the main, or Alta vein, of about 20' average width, being developed for about a mile horizontally. Values in developed workings are mainly in silver and lead, with a little copper and gold, and occasional sphalerite, the lead and zinc decreasing

and copper increasing with depth. Copper ore is mainly chalcopyrite, carrying silver and a little gold, apparently of low average grade, and somewhat refractory, though it can be mined cheaply. Mine assay records, during 1903, the last year of work by the old owners, gave an average of 1.75% copper, 4% lead, 9 oz. silver and \$1.40 gold per ton.

The old Alta mine had about 17 miles of workings, developed mainly by tunnels, No. 8 being the main tunnel, and was dry, even to the greatest depth attained.

New development is by a 1,000' three-compartment shaft, near portal of No. 8 tunnel, with about 700' of laterals, but money gave out and operations were suspended in Aug., 1910, since which date leasors have gouged the old workings near the surface, but no other work has been done. A crosscut at 665' depth showed the Alta vein to be about 30' wide, 560' from the shaft, said to give a fair copper showing.

Company is said to have a hydro-electric power plant, estimated as capable of developing 1,400-h. p., on Prickly Pear creek, and there also is a small auxiliary steam plant. Equipment includes an electric hoist good for 1,200', and a 10-drill air compressor. There is a 30x70' boarding house, and an old mill, of little present value, but having a good site.

The Alta was a large and profitable producer for 2 decades, but ore became low in grade and refractory, hence suspension in 1893, when silver suffered marketwise. The property was reported upon favorably by Pearse, Kingston & Browne, who stated that it was "not so much a mining venture as a manufacturing proposition on a large scale," and also stated that "mining risks are practically nil" in this venture. Company has issued \$1,400,000 out of its capital stock and in 1912 had an outstanding debt of \$30,000, and at least \$40,000 more is needed to put company on its feet. Company is not regarded favorably, on account of the chain of reorganizations, and its promotion by Marcus L. Hewett, whose record as a promoter includes a number of unsuccessful ventures. Idle.

BOSTON & ARIZONA SMELTING CO. (NEVADA). ARIZONA

At Benson, Cochise Co., Ariz. Owned a small smelting plant, never operated and of slight value. Probably now owned by bondholders under foreclosure proceedings. See description Vol. X.

BOSTON-COLBY COPPER MINING CO. MONTANA

Mine P. O.: Saltese, Missoula Co., Mont. Peter Peterson, pres.; Hon. Andrew Flaig, sec. and gen. mgr.; Ole H. Linn, supt. Organized Sept. 16, 1903, in Montana, capitalization \$1,500,000, shares \$1 par, with 700,000 treasury shares, 400,000 still in treasury.

Lands, 9 claims, area 180 acres, and a 5-acre mill site, lying next east of the Butte-Cœur d'Alene Copper Mining Co., immediately west of Saltese, in the East Cœur d'Alene, formerly known as St. Regis district. Lands have 2 copper-bearing veins, No. 1 of about 40' width, and No. 2, to the south, of about 3' width, carrying mainly chalcopyrite, with some bornite, of good average grade. Development is by 2 crosscut tunnels, upper of 400', lower of 900' length with about 500' of drifting in both tunnels. Property crossed by C., M. & St. Paul railroad. Wood and water are abundant.

BOSTON & CORBIN COPPER & SILVER MG. CO. MONTANA

Secretary-Treasurer's address: 67 Milk St., Boston. Mine office: Corbin, Jefferson Co., Mont. Harry M. Stonemetz, pres.; A. B. Clough, vice-pres.; preceding officers, Charles H. Cole, Frederick L. Dabney, Ellis L. Dresel, David A. Ellis, directors; Dan Courtney, mgr. Organized Aug. 27, 1906, under laws of Maine, capitalization \$675,000, shares \$5 par, nonassessable; issued, \$500,000. Federal Trust Co., Boston, registrar; Boston Safe Deposit

& Trust Co., transfer agent. Stock is listed on the Boston Stock Exchange. Annual meeting, fourth Monday in August. Company sold 40,000 shares at \$5; 10,000 shares at \$7.50, and 10,000 shares at \$25. Bonds \$450,000, 6% convertible, of which \$200,000 were sold at 90. After spending \$705,000 and building a concentrator, it was found that the company was in debt and needed new financing. Reorganization was accomplished June, 1913, by formation of a new company with 200,000 shares, \$5 par, which were exchanged for securities of the old company on basis of 75,200 shares for \$200,000 6% convertible bonds and 100,000 shares exchanged share for share upon payment of a subscription of \$1.50 per share for the old stock. This leaves 24,800 shares in the treasury.

Property embraces the Bertha mine and 12 patented claims aggregating 157 acres, about 1 mile west of Corbin, having about 4,500' of the strike of the Bertha vein. Country rock is granite with intrusive porphyry rocks, carrying a vein system consisting of a number of parallel fissures. The geological conditions are often called similar to those of Butte, but ore is mainly chalcopyrite, instead of chalcocite, as in Butte, with some enargite and a little bornite of good grade, all argentiferous and slightly auriferous. Lands said to have 16 veins, of which 3 are under development. The Bertha vein is a well-defined, but narrow fissure in granite, varying from 2 to 5' wide with strong walls. Management estimates the 3 veins under development as of 5' average width. The shipping ore from the Bertha vein carries 4 to 6% copper. The concentrating ore is pyritic and low grade, the concentrates running 7% copper, 8.6 oz. of silver per ton with \$2.38 for excess iron; a total value of nearly \$20 per ton. Management's former estimates proved too optimistic as to values, development being disappointing, but geological conditions on 1,200' level are said to indicate richer ore below. Property examined by Frank H. Probert in March, 1913. His report has not been made public, but he is credited with an estimate of 150,000 tons of developed ore, enough to run the mill 2½ years.

The mine is developed to a depth of 1,200' and has 15,000' of workings, not including 4 short discovery tunnels, the 102 Boston Fraction crosscut tunnel, 1,500' Corbin crosscut tunnel and 880' Bertha drift tunnel. The 1912 annual report states that on the 900' level the vein for 164' of drifting had an average width of 4', with an average value of 3% copper and 5 oz. silver. On the 1,200' level, 993' of drifting developed several orebodies, whose values were not as good as on the ninth level. A lead-silver vein, 837' west of the shaft on the 1,200' level has been opened for 33' with both faces in ore.

A 200-ton concentrator costing \$125,000 was finished and put in operation March, 1913, but proved of poor design and was remodeled in May with marked improvement in results. This mill treated 4,540 tons of ore in May. Costs were as follows: Mining, \$2.80 per ton; concentrating, \$1.08 per ton; miscellaneous and eastern expense, \$0.57 per ton. Total, \$4.45 per ton, or \$20,224. Returns were \$17,376, or \$3.82 per ton, a deficit of \$2,848, or \$0.63 per ton.

Equipment includes an electric hoist, capable of raising 5-ton loads from a depth of 2,000', at the rate of 900' per minute, and a 15-drill Ingersoll-Rand air compressor, direct-connected to a 150-h. p. motor. Power is bought from the Missouri Power Co., at a considerable saving over steam. There are 19 buildings, including a boiler house, engine house, compressor house, bunk house, boarding house, changing house, warehouse, office, laboratory, smithy and dwellings. Cost of wagon freight to railway is \$2 per ton on ore. Production, 1907, from test shipments of ore secured from

development, was 157,000 lbs. fine copper. Company plans continuing underground development by sinking, crosscutting and drifting.

BOSTON DOMINION COPPER CO.

MANITOBA

Probably idle. F. W. Thayer, pres.; J. Norton Binkly, treas., at last accounts. Mine at Ingolf, Selkirk Co., Man. Organized 1910, under laws of Massachusetts, capitalization \$1,000,000, shares \$1 par, nonassessable. Lands, 51 acres, known as the Mineral King mine, claimed to carry a 20' fissure vein, nearly vertical, traceable 1,500' on this property, and for 2 miles all told, carrying auriferous copper ore, said by company to be developed by 2 shafts, which presumably are mere pits. Lands are on the shore of Hawk lake, 95 miles east of Winnipeg, and this constitutes the first attempt at a copper mine in Manitoba, the property belonging geologically to the extreme western part of the Rainy Lake-Rat Portage field.

The company in its prospectus omits the names of all of its officers, and claims that this mine is located in the most prolific mineral region in the world, which, unfortunately, is not true, stating that the bulk of the copper production of the United States comes from that vicinity, which is a rather remarkable claim, considering that this mine is located in Canada. The company credits its district with the entire copper and iron production of Lake Superior, the nickel and copper production of the Sudbury district, and the silver production of Cobalt. Company was endeavoring, Feb., 1911, to sell its shares at par, and for a raw prospect, having 50 acres of lands, with 2 pits, a selling price of \$1,000,000 is absolutely unjustified. Apparently, merely a stockjobbing enterprise, and is regarded with much suspicion.

BOSTON-ELY MINING CO.

NEVADA

Office: 84 State St., Boston, Mass. Mine office: Kimberly, White Pine Co., Nev. Arthur L. Robinson, pres.; Chas. H. Farnsworth, vice-pres.; Jerome C. Smith, sec.-treas.; preceding officers, Geo. E. Keith and Wm. D. Elwell, directors; E. C. Chase, cons. engr.; Edw. W. Ralph, supt. Organized Nov., 1907, under laws of Maine, capitalization \$2,000,000, shares \$10 par, assessable; paid in, \$4; issued, \$1,700,000. Was a reconstruction of Boston-Ely Development Co., and owns a two-thirds stock interest in the Ely Western Copper Co. Company had \$52,000 cash in treasury, June, 1913, and working expenses average \$2,500 per month.

Lands, 22 claims, patented, area 300 acres, adjoining the Giroux on the west. Development is by the 1,260' Emma shaft, the deepest in the district, proving the existence of disseminated ores, in jasperoid and altered limestone in depth, but the average value is low. Property also has Emma and Matilda veins, the former 72' wide in lower level, too low-grade to work, but said to carry high-grade ore, from which small shipments were made. Equipment includes a 180-h. p. boiler plant; a new Sullivan straight line compressor of 528-cu. ft. capacity, new station pump and a good surface plant.

Property located on contact belt outside of monzonite porphyry mass in which disseminated ores occur. May find rich ore, such as that of the Alpha shaft of the Giroux Co., but thus far, despite intelligent development and ample funds, has failed to find any large amount of commercial ore and is therefore still a prospect. Tried diamond drilling, but jasper and soft limestone proved unfavorable, and churn drilling from the 1,240' level was proposed. When its neighbor, the Giroux Co., stopped pumping from its deep Alpha shaft, March, 1913, the Boston Ely pumps, which were raising 20,000 gals. per day, could not handle the inflow of water and the 1,245' level flooded. The management wisely decided it unwise to install new pumps to drain not only this mine, but the surrounding area, and

ordered further prospecting to be done on the 1,100 level, instead of the 1,245.

A crosscut driving west on this level is intended to show whether ore occurs in the 3 fissure veins alongside of or near a big porphyry dike, which crosses the Emma and Matilda claims. This crosscut, 425' long June, 1913, and advancing 5' a day, is passing through a belt of limestone altered by contact metamorphism, leached, iron stained and rotted. It is similar in nature to the rock, carrying high-grade ore at the Alpha shaft of the Giroux. The porphyry dike, noted above, runs northeast-southwest, through the shell of altered limestone about the main porphyry mass and it is hoped the dike has ponded back the copper-bearing water leached from the rock and formed orebodies along the dike contact. The company plans raising a shaft to surface on this contact. The management is competent, honest and property a promising mining venture.

BOSTON EXPLORATION CO.

WASHINGTON

Dead, or ought to be. A flagrant promotion of E. E. Houghton. See Vol. X.

BOSTON-IDAHO MINING CO.

IDAHO

Office: 1137 Old South Bldg., Boston, Mass. Mine office: Ketchum, Blaine Co., Idaho. A. Mayo, Jr., pres.; Frank M. Johnson, vice-pres.; Geo. E. Burnham, sec.; W. M. Pierce, asst. treas. and local mgr.; Fred W. Smith, supt. Organized May 28, 1907, under laws of Maine, capitalization \$200,000; nonassessable; capitalization was given, May, 1909, by fiscal agents, at \$500,000; present capitalization unknown.

Statement filed April 1, 1912, with Secretary of State of Maine, gave: Real estate, \$556,399; machinery, etc., \$50,226; cash and accounts receivable, \$2,434; horses and wagons, \$1,386; stock in treasury, \$9,616; mining costs, \$82,507; total, \$702,568. Liabilities were: Accounts payable, \$42,124; floating debt, \$7,840; funded indebtedness, \$22,800; working capital, \$129,804. The ore pile valued at \$955,102 in the 1910 report has disappeared. Reports from Hailey, in 1912, stated that an issue of \$25,000 6% 10-year gold bonds had been floated and overdue bills were being paid up preparatory to a resumption of work at property.

Another company of same name owns and is operating 2 gold dredges on Elk and Moore creeks, near Idaho City, and had a bond on the Banner mine.

Company has never supplied much information about the property it claims to own. It holds, or did hold, the Ontario and Lucky Boy groups of 11 claims on Warm Springs creek, Boyle mountain, in the Bullion district, near Ketchum, Idaho. Thousands of dollars are said to have been taken from these groups in the past, the Ontario mine carrying copper and silver-lead ores, the Lucky Boy having zinc ore. Developed by 7 tunnels, aggregating 1,200' of workings, have ore averaging 35% zinc. In May, 1909, mines were claimed to have 6,400' of workings, with a productive capacity of more than 100 tons daily. Mines apparently have 8 tunnels, and manager reported, officially, 1909, that more than 2 years' supply of ore had been blocked out for stoping. Mine was claimed, 1907, to have 15,000 tons of low-grade ore on the dumps, also 800 tons of tailings. The L. Diamond Co. stated, May 28, 1909, that the company had 3 producing mines, and that the annual production from 1 mine was more than 3½ times the necessary tonnage of ore for dividend requirements of 20 cts. per annum, and that the other 2 mines were equal in production, with ore of high value, but there was no annual production when these statements were made.

Buildings include an office, laboratory, 2 warehouses, boarding house,

bunk house, 2 smithies, 2 stables, 2 powder houses, 2 ore houses and 8 dwellings. There also is a 5,000' sawmill. Company was claimed, 1908, to plan a hydro-electric power plant.

An old 30-ton mill was in commission, 1907, for a short time, and a carload shipment of ore or concentrates was made Oct., 1907. The old mill was dismantled in the summer of 1908 and a new mill is supposed to have been built on the same site, in 1909, but produced nothing. Property has been intermittently worked for many years. The remarkable statements concerning the property by its fiscal agents are described Vol. X.

BOSTON & JEROME COPPER CO.

ARIZONA

Office and mine: Jerome, Yavapai Co., Ariz. J. C. Scott, pres.; I. P. Nikell, vice-pres.; A. A. Macpherson, sec.-treas. Organized 1907, under laws of Arizona, capitalization \$1,500,000, shares \$1 par, increased, May, 1908, to \$2,500,000, shares \$5 par. Lands, 12 claims, including the Juniper group of 9 claims, area 146 acres, 2 miles south of Jerome. Development includes 2 tunnels, of 266' aggregate length, and a 130' shaft, sunk on a large porphyry and schist dike carrying carbonate copper stains. Idle since Feb., 1908.

BOSTON & LAKE SUPERIOR MINERAL LAND CO.

MICHIGAN

Office: Leopold Bldg., Houghton, Mich. Fred W. Nichols, resident agt. Property is mineral land in the Lake Superior copper district. No mining work ever done.

BOSTON-MEXICO MINES CO.

ARIZONA

Organized under laws of Arizona, capitalization \$1,000,000, articles of incorporation filed in Cochise Co., Ariz. July, 1912. Letters sent to Tombstone returned unclaimed. Report made to Secretary of State Nov. 1, 1912, shows: Assets—Capital stock, \$109,190; mining rights, \$999,993; cash on hand, \$12. Liabilities—Capital stock, \$1,000,000; accounts payable, \$900; profit and loss, \$108,295; total, \$1,109,195.

BOSTON & MONTANA DEVELOPMENT CO.

MONTANA

Office: State Savings Bank Bldg., Butte, Mont. Mine offices: French Gulch, Deer Lodge Co., Mont., and Elkhorn, Beaverhead Co., Mont. Hon. W. R. Allen, pres.; W. C. Siderfin, vice-pres.; L. P. Benedict, sec.; Arthur Perham, treas.; Hon. Sir Frederick W. Bowden, Ottawa, Canada, chairman of board; preceding officers, William Wallace, Jr., Helena, Mont.; Charles E. Miller, Wisdom, Mont., and Joseph J. Wall, Boston, Mass., directors. Organized 1913, in Montana, capitalization \$15,000,000, shares \$5 par.

Holdings are varied, including 27 lode claims and 6 placer claims in the French Gulch district, Deer Lodge county, Mont., and 26 lode claims in the Elkhorn district, Beaverhead county, Mont. It will practically control all of both these districts.

Both French Gulch and Elkhorn were opened in 1865, in the rush which followed the discovery of gold at Bannack, a few miles to the south, in 1862.

The French Gulch group of claims has been opened up by shafts and tunnels, principally upon the Spain, Lucky Strike, Golden Crown and Leo. The work on the Spain consists of a 900' tunnel and 200' shaft, with 800' of drifting on the 200' level. The drift tunnel is about 350' below the apex and shows the vein to carry from a few inches to 4' of sulphide ore, averaging \$17 a ton, according to estimates made by James E. Beveridge, E. M. Ore is said to be blocked out to the value of \$500,000.

The Lucky Strike has a 200' tunnel following a contact vein reported to be 20 to 40' wide, and 100' shaft with 300' of drifting on the vein whose thickness is reported to be 35', with a paystreak of ore running from \$41.50 to \$80 gold, 5 to 7 oz. silver and 2½% copper.

The vein has been opened on the 1,000' to the west by another 100' shaft, with 600' of drifting, showing an orebody 12' wide averaging \$18 a ton, according to the management.

Eight hundred feet of tunneling on the Golden Crown claim shows a 1 to 3' vein said to carry \$8 to \$20 ore.

Besides these there are numerous smaller shafts and tunnels on the various claims in the French Gulch group.

The Elkhorn property consists of the Central group on which Tunnel No. 1, 800' on the vein, varies from 28 to 54' wide, according to the management. The tunnel is about 300' below the apex of the mountain.

The company will drive a new tunnel about 1,000' below Tunnel No. 1 and proposes to build a railroad (Butte, Wisdom & Pacific railway) to the district.

Other tunnels, pits, trenches, etc., on the Elkhorn group expose a series of veins running through the properties, averaging from 4 to 20' in width.

Surface equipment, improvements, including developments, timber and water rights, are estimated by the owners to have cost in excess of \$500,000.

The company proposes to give both camps railroad transportation to the Butte and Anaconda smelters, and to operate through leases and subsidiary companies in which it will retain around 50% of its stock.

Company's plans are ambitious and the properties long known, but almost unworkable for lack of cheap transportation. They are regarded as promising.

BOSTON-PARRY SOUND COPPER CO.

ONTARIO

Mine office: Parry Sound, Parry Sound district, Ont. Organized June, 1908, under laws of Maine, capitalization \$1,000,000, shares \$1 par. Lands, 200 acres, in the vicinity of the Willcox and McGowan mines. Idle some years but owners are well-to-do and expect to reopen property some day. Is a close corporation.

BOSTON-SIERRA MADRE MINE INDUSTRY CO.

COLORADO

Office: 430 Railway Exchange Bldg., Denver, Colo. Mine office: Columbine, Routt Co., Colo. Amos Pettibone, pres.; Dr. Daniel Pease, vice-pres.; Lewis A. Pease, sec.-treas. and gen. mgr. Organized Dec., 1900, under laws of Wyoming, capitalization \$1,000,000, shares \$1 par, non-assessable; fully issued. Annual meeting, second Wednesday in January.

Lands, 2 claims, patented, area 40 acres, in the Three Forks district, carrying 2 fissure veins in andesite, one of about 14' average width, opened by several pits of 10 to 25', and a 165' shaft and 670' tunnel, with about 1,200' of workings, showing cuprite, chalcopryrite and argentiferous galena, estimated by company to carry a small percentage in copper, 5 to 60% lead, 5 to 50% zinc, 10 to 600 oz. silver, with an average of about 50 oz., and from a trace to \$1,400 gold per ton, with an average of about \$4. Pay-streak varies; when high in zinc is low in silver and lead. Equipment includes several mine buildings. Idle since 1907, owing to lack of funds.

BOSTON SONORA MINES CO.

ARIZONA

Organized about Dec., 1911, under laws of Arizona, by Thomas Patterson, Wm. A. Clark, H. C. Wilderson, James V. Howard and Royal B. Young, all of Massachusetts. Capitalization \$1,000,000, shares \$5 par.

BOSTON & TINTIC MINING CO.

UTAH

Office: Provo, Utah. Mine office: Mammoth, Juab Co., Utah. Jesse Knight, pres.; Wm. H. Tibbals, vice-pres.; W. Lester Mangum, sec.-treas. Organized 1899, under laws of Utah, capitalization \$1,000,000, shares \$1 par, assessable; issued, \$747,000. Lands, 3 claims, patented, area 46 acres, near Black Jack mine, carrying 2 fissure veins, in porphyry, of which 1,

of 3 to 5' average width, traceable 2,000', has been opened by tunnels of 40', 70' and 120', and by a 240' incline shaft that followed the vein and cut bunches of good ore assaying 1 to 3% copper, 20 to 55% lead, 25 to 45 oz. silver and 80 cts. gold per ton. The ore occurs on a limestone-porphry contact and a new 103' shaft is said to be in shipping ore.

BOSTON-UTAH MINING CO.

UTAH

Address: care Edgar S. Hill, 508 Tremont Bldg., Boston, Mass. Mine office: Basin, Grand Co., Utah. Was organized as a merger of the International Gold & Copper Mining Co. and Dirigo-La Sal Mining Co. Lands, 35 claims, in 2 groups, 1 of 23 claims and a mill site, on Deep creek, 12 miles from Castleton, having been taken over from the Dirigo-La Sal, and another group, of 2 claims and a mill site, on Beaver creek, was taken over from the International Gold & Copper Mining Co. Apparently the ore carries about 3% copper, and 40 cts. to \$1.40 gold per ton. Development includes a number of shallow pits and short tunnels, 1 planned to be driven about 3,000', to cut a number of veins at depth of 1,200 to 1,500'. Equipment includes necessary mine buildings. Presumably idle.

BOSTON & WYOMING COPPER MINING CO.

WYOMING

Office: care Col. Jas. A. Shinn, Leadville, Colo. Mine office: Esterbrook, Albany Co., Wyo. Organized Jan., 1903, capitalization \$500,000. Property, which is the oldest in the district, includes 120 acres mineral lands, patents applied for, 1912, and 120 acres miscellaneous lands, taken over from Esterbrook Mining Co. The Esterbrook mine has a 4' fissure vein, traversing diorite, schist and granite, carrying cuprite, chalcopryrite, cerussite and galena, estimated by former owner to average 2 to 4% copper, 25 to 30% lead, 2 to 4 oz. silver and \$1 to \$2 gold per ton, developed by 2 short tunnels and 5 shafts, deepest 335'. Company plans to sink shaft 100' deeper in 1913.

BOWYER GOLD & COPPER CO.

ARIZONA

Office: Quartzite, Ariz. Mine office: Bouse, Yuma Co., Ariz. W. L. McPeak, pres.; David L. Watson, vice-pres.; Jos. Bowyer, sec. and gen. mgr.; preceding officers, J. Delmar Bowyer and E. N. Jenkins, directors; Phoenix National Bank, treas. Organized July 15, 1909, under laws of Arizona, capitalization \$5,000,000, shares \$5 par, nonassessable. Annual meeting, first Monday after first Tuesday in July.

Lands, 7 claims, known as the Swastika group, also 160 acres miscellaneous lands, in the Plomosa district, on the western slope of the Dome Rock mountains, about 20 miles west of Bouse. Property has 3 contact deposits, between schist hanging and limestone foot, showing 50 to 200' gossans and carrying malachite and chalcocite, estimated to average 2 to 10% copper and \$1 to \$10 gold per ton. Company has sunk a 50' shaft near the hanging wall, all in ore, and has reached the sulphide ore beneath the leached zone. Company plans installing a 25-h. p. gasoline hoist.

BOYER CONSOLIDATED MINING CO.

NEVADA

Mine P. O.: Boyer, Churchill Co., Nev. Arthur Howe Carpenter, sec. and supt. Organized under laws of Arizona, capitalization \$10,000,000, shares \$1 par, nonassessable. Is a reorganization of the Boyer-Nevada Copper Co. Property, 50 claims, 1,000 acres, also a 10-acre mill site and 160 acres of placer lands, at Boyer, about 30 miles from Wonder, Nev., and 75 miles south of the S. P. R. R. at Winnemucca, in the copper belt of the Piute mountains.

Claims cover a mile of the western end of a contact between whitish andesite and an underlying greenstone, or andesite, which shows copper pyrite peppering the rock. The ore bed has a dip of but 20° and a thickness of 100' and is much altered, the footwall being a hard, silicious band.

The lower 30' carries 5% copper but the orebody developed was figured by Prof. Carpenter and A. H. Carpenter to assay 1.7% copper and about 70 cts. per ton in gold. High-grade ore occurs in small iron-capped veins which extend up through the porphyry and carry a breccia of rock fragments cemented by copper glance and bornite.

Developed by 170' shaft and 800' tunnel, now inaccessible. Present company has done about 500' of work on Treasury Box hill and exposed a faulted block of 200' length, 100' width and with 500' depth on the dip, assaying as above. Property promising when railroad facilities are provided.

BRADEN COPPER CO.

See same title in Part II.

BRADFORD MINE.

ARIZONA

Near Patagonia, Santa Cruz Co., Ariz. Mine is property of Ferry estate, leased, 1912, to Messrs. Lindsey, McFarland & Gardner, who shipped 5 cars of ore to the Copper Queen smelter at Douglas.

BRANIFF y CA., S. A.; NEG. MINERA DE O. y T.

MEXICO

Office: Rosales 1, Mexico, D. F. Mine office: Caracuaro de Morelos, Tacambaro, Michoacan, Mex. Mine and works office: Cadereyta de Montes, Cadereyta, Queretaro, Mex. Thos. D. Murphy, gen. mgr. Organized Feb. 3, 1905, under laws of Mexico, capitalization 250,000 pesos.

Lands include El Doctor and La Negra mines, carrying mainly silver-lead ores, with considerable zinc and small copper values. Equipment includes electric power and an auxiliary steam plant.

Works include a mill and smelter, former having 5 stamps, Huntington mills, and a 125-ton cyanide plant. The smelter, at Maconi, 50 miles from Bernal, on the main line of the Mexican National railway, is connected therewith, for greater part of distance, by good wagon roads, with 15 miles of indifferent mountain roads. The smelter has two 36x36" Colorado Iron Works water-jacket blast furnaces, and an octagonal cupola furnace taking 35-ton charges of lead bullion for refining, with a Connersville blower. Employs 250 men, normally, and is a considerable producer of lead and silver, with a small output of copper. Impossible to get returns on account of Mexican revolution and property probably idle for same reason.

BRANT GOLD & COPPER CO.

COLORADO

Geo. Brant, Denver, Colo. Mine: Pitkin, Gunnison Co., Colo. Organized May, 1913, to acquire the Abe Lincoln and Sunnyside mines, 3½ miles south of town of Pitkin. Abe Lincoln has tunnel 254' long, from which a 300' drift has been run on a vein 3' wide that assays up to \$41 per ton in gold and copper.

BRANT INDEPENDENT MINING CO.

COLORADO

P. O.: Pitkin, Gunnison Co., Colo. A. P. Nelson, pres. and mgr.; J. F. Anderson, vice-pres.; L. H. Becker, sec.; A. W. Lindquist, treas; preceding officers, M. Woolley, J. W. Hickman, R. B. Anderson, T. R. L. Daughtrey and J. E. Sawtell, directors. Capitalization 5,000,000 shares, par value \$1, fully paid, nonassessable; 4,276,174 shares issued. Bond issue \$150,000, 8% authorized; \$15,000 issued. Dividends to date \$8,174. Annual meeting, second Tuesday in January.

Property, 96 claims, partly patented, of about 1,056 acres, in Box Canyon and Quartz Creek districts of Gunnison county, Colo. Four mines, the Camp Bird, I. X. L., Gold Ridge and Roosevelt, opened up and proven by Camp Bird shaft 200' deep; I. X. L. shaft 60' and 90' crosscut and the Gold Ridge tunnel which follows vein for 130'. Ore occurs in fissure veins 6 to 20' wide in diorite and granite. Ore said to carry 8% copper and \$20 gold per ton.

Crosscut tunnel, started in April, 1911, to drain and open up the entire territory at depth, had been driven 1,642' on March 1, 1913. Steam power used to date, but plans have been made for installation of water power. Quartz creek runs through the property. Mine is only a few feet from D. & R. G. R. R. and county road. Annual report shows that \$19,531.07 was expended on property in 1912.

BREWER GOLD & COPPER MINING CO.

UTAH

Idle. Office: 202 Utah Savings & Trust Bldg., Salt Lake City, Utah. Mine office: Ibadah, Tooele Co., Utah. J. P. Gardner, pres.; S. W. Morrison, vice-pres.; H. B. Windsor, sec.-treas.; John Martine, asst. sec. Organized Feb. 16, 1907, under laws of Utah, capitalization \$50,000, shares 10 cts. par, assessable; 4 assessments have been levied. Lands, 11 claims, 6 patented, on Dutch mountain, in the Clifton district, 50 miles from a railroad, having a limited amount of development work, showing argentiferous copper ore. Shut down several years, awaiting building of branch railway line from Wendore, on the Western Pacific railroad.

BRIDGE CREEK MINING CO.

WASHINGTON

Idle. Mine: Keller, Ferry Co., Wash. Lands, 100 acres, on Bridge creek, near the Congress mine, 14 miles north of Keller, opened by a 246' tunnel, said to show ore assaying \$80 per ton in combined copper, gold and silver values.

BRIONES; FELIX.

MEXICO

Idle. Mine office: Topia, Tamazula, Durango, Mex. Property has silver and copper ores. Employs about 30 men when active.

BRISTOL AVON MINING CO.

NEVADA

Idle. Office: 325 Brooks Arcade, Salt Lake City, Utah. Mine office: Pioche, Lincoln Co., Nev. Jackson C. McCrystal, pres.; Wm. R. Wallace, vice-pres.; Jas. E. Berkley, sec.-treas. Organized under laws of Utah, capitalization \$250,000, shares 25 cts. par, nonassessable. Lands, 13 claims, area 200 acres, patented, about 10 miles northwest of Pioche. Property includes several mines that have been considerable producers in the past, from shallow shafts, less than 100' in depth. Property shows ore giving assays up to 23.5% copper, 16.5 oz. silver and \$2 gold per ton. No reports: letters unanswered, 1913.

BRISTOL CONSOLIDATED MINES & SMELTING CO.

NEVADA

Secretary and office: Arthur W. Middleton, 115 Broadway, New York. F. L. Underwood, pres.-treas.; preceding, Wm. Gelder and E. F. Freudenthal, directors. Incorporated June 4, 1906, under laws of Arizona, capitalization \$4,000,000, shares \$1 par; issued, \$2,750,000. Company controlled by California Nevada Copper Co. and itself owns the Bristol Copper Co. and the Hillside Copper Co., whose properties comprise 400 acres, including 20 mines and an 80-acre smelter site in the Bristol mining district, Pioche, Lincoln Co., Nev. Mines carry copper ore, having gold and silver values, developed by 10,000' of shafts, tunnels and drifts, from which shipments are now being regularly made.

Equipment includes power plant, hoists, compressor and electric-light plant.

The properties above mentioned, together with the Day mine of the Nevada Utah Co., are operated by the Day-Bristol Consolidated Mines Co., this company owning \$3,000,000 of the stock of the latter.

BRISTOL COPPER MINING CO.

NEVADA

At Pioche, Lincoln Co., Nev. Controlled since 1906 by Bristol Consolidated Mines & Smelting Co. Properties now worked since June 13, 1911, by the Day Bristol Consolidated Mines Co.

BRISTOL VALLEY MINING CO.**NEVADA**

Idle. Office: 511 Tribune Bldg., Salt Lake City, Utah. Mine office: Pioche, Lincoln Co., Nev. A. C. Ellis, pres.; W. H. Dickson, vice-pres.; C. B. Felt, sec.; Walker Brothers Bank, treas. Organized June, 1907, under laws of Utah, capitalization \$250,000, shares 50 cts. par, nonassessable. Lands, 11 claims, 2 patented, 2 miles from Pioche, having 3 incline shafts, deepest 80', with a little surface trenching.

BRITANNIA MG. & SMELTING CO., LTD. BRITISH COLUMBIA

Office: care Howe Sound Co., Moore & Schley, 747 Fifth Ave., New York. Canadian office: 31 Davis Chambers, Vancouver, B. C. Mine at Britannia Beach, New Westminster district, B. C. Smelter at Crofton, Vancouver island, B. C. Hon. Edgar Dewdney, pres.; J. W. D. Moodie, vice-pres. and gen. mgr.; G. M. White, sec.-treas.; preceding officers, D. G. Marshall and C. B. McNeill, directors. Company is a close corporation controlled by the Howe Sound Co. of New York, in which G. B. Schley, of Moore & Schley, New York, owns control.

Organized 1908, under laws of British Columbia, capitalization \$2,500,000, shares \$25 par; issued, \$1,625,000; was organized to take over the Britannia mine and assets of the Britannia Copper Syndicate and the property of the Britannia Smelting Co., Ltd. Annual meeting, first Monday in March. Balance sheet for 1912, submitted March 6, 1913, showed \$1,000,000 expended in year on improvements to increase output of mine to 2,000 tons per day. Net profits were \$1,250,000.

The company owns the Britannia group of 7 claims, 297 acres on the east shore of Howe sound and the Empress group adjoining it on the east; last named was bought in 1912 for \$150,000. The contiguous South Valley group was also purchased for \$225,000, but the property is not yet transferred to the company on account of legal proceedings.

The Britannia mine lies on Britannia mountain, 4 miles from and about 3,500' above the sea, carrying approximately 8,500' of the strike of a mammoth mineral zone, orebody consisting of mineralized schist in lenses and large irregular bodies, ranging 300 to 600' in width, the schistose silicious material being impregnated with copper and iron pyrites. The ore consists of chalcopyrite and pyrite in quartz and averages 2% copper, but as mined, 1913, runs 5.5%. There are 8 known orebodies, of which 3, more or less developed, carry an average of about 2.5% copper, 0.04 oz. silver and 50 to 80 cts. gold per ton. Development is by large glory holes and by a number of tunnels. Principal tunnels are the Big Bluff and Jane, latter, which is the main operating tunnel, having a 600' trestle with 10-ton self-dumping cars and an automatic incline tram line. The Big Bluff tunnel has a 640' trestle with 10-ton self-dumping cars, and a gasoline locomotive. A new low-level tunnel, 5,000' long, completed July, 1913, gives a depth of 2,200' on the orebody and 1,200' below the old workings. This tunnel is connected with the mill at Britannia Beach by a private railway line. Development to date shows about 1,000,000 tons of ore blocked out valued at \$8 per ton.

At the mine are Blake crushers, which pass crushed ore to a sorting belt, thence to a 1,000-ton receiving bin, whence ore is taken by a 16,900' aerial tram in 2 sections, the upper of 5,800' and the lower of 11,100' with an intermediate transfer station. The tram is rated at about 300-tons daily capacity, but has given some trouble in operation. The upper section has a drop of 1,400' and the lower 1,800'.

Equipment includes 300-h. p. steam, 400-h. p. water and 500-h. p. electric power. A new hydro-electric plant of 5,000-h. p. is being installed. A 35-drill Rand air compressor, at the beach, sends air to the mine through

an 18" pipe line. There is a 3-mile transmission line, with two 300-kw. 6,600-volt generators, driving the machinery plant at the mine, actuated by a Pelton water wheel, located at the beach, which receives water from a creek under an effective head of about 1,900'. By the end of 1913 the entire plant will be remodeled. At the beach there is a 250' wharf with a 90' wing for receipt of mine supplies and shipment of concentrates.

The 300-ton concentrator, 125x133' in size, of wood, has 2 Blake crushers, 3 Chilean mills, 4 rolls, 34 Hartz jigs, 1 Hancock jig, 2 Cammett concentrators, 11 Wilfley tables, 11 Overstrom tables, 10 Johnson vanners and 22 Frue vanners. Mill was remodeled, 1907, changing its methods from fine to coarse crushing, trouble having been experienced in concentration under the fine-crushing system. In 1912 a flotation plant of the Minerals Separation Co. was successfully applied to the ores. This plant, in operation for many months, gave 94% recovery and the 600-ton unit to be put in commission in September is expected to produce 22% concentrate and 0.2% tailings. A new mill has been built, 1913, which includes five 8' Hardinge conical mills and one 6' Hardinge conical ball mill.

A new camp with all necessary buildings for equipment and men is built at the portal of the new tunnel. These mine buildings are the best and most comfortably equipped in British Columbia. Wages paid are \$3.75 for miners and \$3.25 for muckers.

The company owns a reduction plant known as the Crofton smelter and formerly shipped its ores across Howe sound for treatment at this plant. At present, however, the entire production of the mine is shipped to the Tacoma (Wash.) smelter, controlled by the Guggenheim interests with which the Britannia owners are closely associated. The company's smelting plant is described Vol. X.

Production was suspended, Oct., 1907-1910. Production, 1906, was 4,409,650 lbs. fine copper, 38,265 oz. silver, 5,261 oz. gold, and 65,922 tons of ore, yielding 3,011,410 lbs. fine copper, of which the Britannia mine furnished 1,706,734 lbs. in 1907; for 1911, production was 102,000 tons of ore and 118,900 tons treated yielding 8,685,000 lbs. copper, 46,000 oz. silver, the combined value being \$1,074,334. In 1912, the mine produced 193,000 tons of ore, averaging 2.5% copper, 0.4 oz. silver per ton of ore and 50 cts. gold. The ore milled averaged 3.75% copper. The metal production was 14,300,000 lbs. copper and 76,500 oz. silver, the total value being \$2,383,285.

Management changed in 1912; sweeping changes were made in personnel, a policy of expansion adopted and non-recognition of labor unions decided upon. A labor strike proved abortive, but a part of the company's force of 700 men left work.

The Britannia proved a hard problem to handle for years, but made money in 1911 and 1912. The present management is thoroughly capable, a successful future certain, and the results a tribute to the far-seeing judgment and persistency of Mr. G. B. Schley.

BRITISH AMERICAN COPPER M. & SM. CO. BRITISH COLUMBIA

Office: Williamson Bldg., Cleveland, Ohio. Mine at Golden, Kootenay district, B. C. Is a swindle, idle many years, and deservedly moribund. Fully described Vol. X.

BRITISH AMERICAN NICKEL CORPORATION.

CANADA

In Sudbury, Ontario, Canada. Dr. F. S. Pearson, J. W. Tyler, Walter Gow, Miller Lash, B. B. Lawrence, J. E. McAllister and E. R. Wood, directors. Incorporated Aug., 1913, under laws of Canada, capitalization \$30,000,000; \$10,000,000 in 6% preferred debenture stock redeemable at \$106, and \$20,000,000 common; fully issued.

Property, 17,000 acres in the Sudbury region, on which development up to May, 1912, had blocked out 6,800,000 tons of copper-nickel ore.

BRITISH COLUMBIA COPPER CO., LTD. B. C. & WASHINGTON

Office: 42 Broadway, New York. Mines and works main office: Greenwood, B. C. Newman Erb, pres.; C. R. Starbuck, vice-pres.; Charles H. Burke, vice-pres.; R. H. Eggleston, sec.-treas.; preceding officers, Anthony N. Brady, Joseph B. Dulany, August Heckscher, Wm. T. Henry, Colgate Hoyt, C. B. Mears, C. I. Stralem and Wm. B. Thomson, all of New York, directors; Oscar Lachmund, gen. mgr.; Frederick Keffer, cons. mg. engr.; F. S. Norcross, supt. of mines; W. L. Bell, smelter supt.; R. G. Hargraves, purch. agt.; Rowland King, chemist-assayer, all of Greenwood, B. C.; F. J. Longworth, mill supt., Napoleon, Wash.; F. R. Weekes, mine supt., at Copper Mountain, Princeton, B. C.; Henry Johns, mine supt. at Nelson, B. C.; A. F. Meyers, chief of office staff, Greenwood, B. C.; Riddell, Stead, Hodges & Winter, official auditors, Vancouver, B. C.

The company was organized March, 1898, under laws of West Virginia, capitalization \$3,000,000, shares \$5 par. Original capitalization was \$1,000,000, increased to \$2,000,000 and in 1907 to present amount; 591,709 shares issued, fully paid and non-assessable. Dividends paid are as follows: No. 1, in 1907, \$201,200; Nos. 2 and 3, in 1911, \$147,930; Nos. 4 and 5, in 1912, \$177,512; No. 6, in 1913, \$88,756; total, \$615,399.

The company controls the New Dominion Copper Co., Ltd. (non-personal liability), through ownership of 64% of the stock and bonds to par value of \$237,675. Has about 2,000 shareholders and ended calendar year Dec. 31, 1912, with favorable balance sheet, which shows: Assets—Copper on hand and in transit, \$214,769; metals and smelter products, supplies, etc., \$193,054; cash, \$83,601; accounts receivable, prepaid insurance and taxes, \$8,686; property at cost, \$3,771,444; a total of \$4,271,557. Liabilities—Capital stock, \$2,958,545; accounts payable, \$336,910; reserves, \$10,365; profit and loss surplus, \$965,736. The net profit for 1912 was \$425,985, out of which \$177,513 was paid in dividends. Total revenues were \$2,491,288; operating expenses, \$1,570,205; custom ore purchased, \$495,087; total paid out, \$2,065,292, balance for dividends, \$495,087; dividends, \$177,513; surplus, \$248,476; previous surplus, \$717,265; surplus, Dec. 31, 1912, \$965,736. New York Trust Co., transfer agt.; Empire Trust Co., New York, registrar. Annual meeting, second Thursday in March.

The lands of the company are extensive, comprising in all approximately 1,900 acres, of which 80 are smelter and mill sites and the balance mineral lands. Claims are held under Crown Grant or U. S. Patents.

The company's chief mines are in 3 distinct and widely-separated localities, viz.: the Boundary, Nelson and Princeton districts. The Lone Star group just across the United States border in Washington, is included in the Boundary district and the claims at Napoleon, Wash., are isolated.

The Mother Lode group of mining claims near Greenwood in the Boundary district comprises 339 acres. The copper ore occurs in a contact deposit between limestone and eruptive rocks, largely as altered limestone that has been replaced by massive garnet, magnetite, silica and alumina, together with iron and copper sulphides. Much lime is also present as calcite. All these minerals are present in such proportions as to make the ore practically self fluxing. Copper occurs exclusively as chalcopyrite, the ore carrying from 1 to 1.75% copper with from 75 cts. to \$2 per ton in gold and silver. The main orebody measures about 160x1,200' running nearly north and south, the greatest width being 260' and the dip

about 70' easterly. There are other smaller and less important ore deposits in the claims nearby.

The ore is mined by both quarrying and underground stoping, though the first method is now almost abandoned owing to the depth of the quarries. The shaft is of 4 compartments, 2 for the 5-ton skips, 1 for a man cage, and 1 for ladders and pipe lines. On the 2 lower levels ore is hauled by electric motors and on the upper levels by horses. It is dumped into capacious pockets at the shaft and hoisted to a bin at the head of the shaft, where it is crushed by 1 of a pair of Farrel crushers, of jaw opening 24x36" and 36x42", respectively. From the crushers it passes to the railway bins over a 200 Robins belt conveyor. At the bin end of the conveyor the ore passes an automatic sampler which cuts out the daily sample.

The transverse stope method of mining is used. Drilling of new ground ahead of requirements was done in 1912, by 5,000 holes aggregating 65,000 lineal feet, all in readiness to blast. This mine alone yielded 410,686 tons of ore in 1912, at a cost of 56.58 cts. per ton f. o. b. cars at the mine.

The Emma group of 3 claims, together with the Oro Denoro, is in Summit camp about 9 miles northeast of Greenwood, the whole comprising 200 acres of mineral lands. There are several ore deposits, the largest being that on the Emma claim. The ore is an altered limestone and the minerals similar to those of the Mother Lode, with the exception that magnetite is greatly in excess, rendering the ore decidedly basic. The copper and gold contents are similar to those of the Mother Lode. The Emma orebody strikes north and south and stands vertical, its average width being 25', with maximum of 60'. The mine is developed by a 275' incline double-compartment shaft and has levels at 150' and 250'. The ore, formerly quarried, is now mined solely in stopes. The mine is closed at present, the ore being held in reserve should future operations develop the need for basic ore. The other orebodies are as yet undeveloped.

The Lone Star group of 3 claims, 52 acres, is 8 miles southeast of Greenwood and is connected with the Canadian Pacific railway at Boundary Falls, by a 28,560' aerial tram, the tram having 72 towers of from 15 to 67' in height with 3 tension and 2 anchor stations. The ore of this mine is contained in a highly-altered, eruptive rock now largely altered to a talcose schist. The orebody, which is nearly flat at the north end of the property, dips to the south in the southern part. Approximately 300,000 tons has been developed by drilling and other work, the major portion of the area being as yet unprospected. The mine is equipped with a 7-drill compressor driven by an electric motor, the hoist being run with compressed air. The average assay value of the Lone Star ore is higher than that of other Boundary district ores, but it is silicious and as it carries alumina as well, it is much more refractory. For this reason the company is arranging to construct a concentrator at Boundary Falls (2 to 2½ miles from Greenwood) and until this is in operation the mine will be closed.

The Napoleon mine, comprising about 60 acres of mineral lands, is in the Pierre Lake district at Napoleon, Wash., 7 miles from Marcus. It contains a large body of auriferous copper and iron sulphides, of low average assay value, the ore being chiefly desirable on account of its high sulphur contents, since the Boundary ores as a whole are deficient in sulphur. The mine equipment includes 2 compressors of 10 drill capacity, Farrell ore crusher, and a 4,100' aerial tramway to the Great Northern railway. The sulphide ores are capped by 75 to 150' of oxidized ore. To treat this ore a 10-stamp mill has been erected, with a 100-ton cyanide

plant. All power is steam, the electric lines not having been extended into the district.

Production of mine in 1912 was 17,118 tons of pyritic ore. Mining and tramway costs averaged \$1.59 for the year.

An energetic campaign of extension has been pursued by this company for the past year. For some years past it has been drilling a group of claims on Copper mountain, on the Similkameen river, and now holds bond and options on the following properties, all considered tributary to the smelter: (1) Ada B. group; (2) Silver Dollar claim; (3) Annie L. claim; (4) Princess Maud claim; (5) Red Eagle claim; (6) Triangle Fractional claim, all in Princess camp; (7) Eureka group, and (8) Queen Victoria group, both near Nelson; (9) L. H. group, near Silverton; (10) Riverside group, near North fork of Kettle river; (11) Copper Mountain district; (12) Greyhound mine, Deadwood camp. An expenditure of \$57,918 on the development of the first 9 of the properties disclosed such favorable conditions that the company made payments of \$21,000 on the bonds.

The company is actively developing a group of 13 claims at Voigt's camp adjoining Princess camp on the north. Since bonding these claims, drilling and underground work has developed about 1,500,000 tons of ore. The ores carry copper with some gold and silver, in an altered quartz-feldspar gangue, in fracture planes. The company has bought a half interest and acquired a mortgage on the other half of 14 claims of the Voigt group.

The Victoria mine comprises 5 claims near Nelson, B. C., about 110 miles easterly from Greenwood. The ore is an altered limestone, similar in genesis, nature and in mineral contents to the Boundary ores, but carrying considerably more copper and silver, with less gold. The mine is equipped with a 5-drill electrically-driven compressor and the ore is taken to the Canadian Pacific railway, on the bank of the Kootenay river, over a 3,000' aerial tramway. The mine ships 2,500 to 3,500 tons per month; it was purchased by the company in 1912.

The Eureka mine, near Nelson, is also under bond to the company, the ore being high-grade copper-gold-silver ore, occurring in a comparatively narrow vein in granite. It is described under the title Eureka Copper Mines, Ltd.

The Silverton, or L. H. group, near Silverton, B. C., which has been under bond for over a year, has a vein 30' wide, with a gangue of fine-grained silicified schist, impregnated with arsenical pyrite, carrying gold. The ore does not carry copper or silver in appreciable quantities.

The B. C. smelter at Greenwood, 5 miles by rail from the Mother Lode mine, receives its ores over the Canadian Pacific railway, and does a general custom business also. The plant is electrically operated, requiring about 1,600-h. p. The furnace and converter buildings are of steel and the others of wood. The original plant had two 300-ton-capacity furnaces, but was remodeled in 1907 to 2,000 tons capacity, and still later to 2,500 tons daily capacity. A 600-ton sampling mill, 65x79' and 3 stories high, has a custom ore bin connected with the sampler by a belt conveyor. All ores are coarse crushed at the bins, then pass the samplers, and then go to the receiving bins over a belt conveyor. The cupola building has 3 blast furnaces, Nos. 1 and 3 being 48x360" at the tuyeres, and No. 2, 48x240". The ore bins have a capacity for 12,000 tons ore and 4,000 tons coke. A 12x14x620' dust flue leads to a 12x121' stack. There are 6 Baldwin-Westinghouse electric motors for the charging and slag lines. The slag cars have 25-ton side-dumping ladles operated electrically from the locomotives.

The converter building adjoins the blast-furnace building and has

2 stands, with 84x126" shells, taking matte with from 35 to 55% copper and producing blister copper of 99 to 99.5% copper, carrying 20 to 50 oz. silver and 5 to 10 oz. gold. Stands are tilted by hydraulic accumulators, and shells, matte, etc., is handled by a 40-ton, 4-motor traveling crane. There is a 72" silica mill for linings. In the power house are three 300' Connersville blowers, each belted to a 300-h. p. induction motor. Also a Nordberg air compressor for the converters, driven by 300-h. p. motor. There are 3 motor generators furnishing direct current to the railway locomotives and an air compressor for operating furnace gates, steam hammers, etc., and an electrically-operated hydraulic accumulator. In addition to other ores the works smelt 600 to 800 tons of ore from the New Dominion Copper Co., Ltd., mines at Phoenix.

Power is purchased on a watt-meter basis from the Bonnington Falls Co., whose plant is 85 miles distant. The voltage is 40,000, transformed to 2,200 volts, 60 cycle, 3 phase at the smelter. All machinery is electric or air driven. The works have a briquetting plant handling flue dust. Smelting fuel is coke, costing under \$6 per ton, consumption being about 90,000 tons yearly.

The new smelter suffered in 1912 a scarcity of coke and for 2½ months but 2 furnaces were running; 740,589 tons was smelted in 13 months ending Dec. 31, 1913, as compared with 608,945 tons for the year ending Nov. 30, 1911; 443,022 tons came from the company's mines, the balance was custom ore. Two furnaces treat 1,700 tons of ore daily, of which 700 come from the New Dominion Copper Co.'s mines, controlled by the British Columbia Copper Co.

Production and costs per ton of ore mined, smelted, converted, refined and marketed since 1904 are shown in the following table:

Year.	Gold,	Silver,	Fine Copper.	Year.	Gold,	Silver,	Fine. Copper,
	oz.	oz.	lbs.		oz.	oz.	lbs.
1905....	26,226	95,410	5,601,309	1909....	18,244	64,234	6,325,000
1906....	20,238	82,193	5,820,651	1910....	24,962	84,180	7,143,456
1907....	24,967	101,114	8,643,133	1911....	31,144	134,266	9,944,987
1908....	13,597	58,204	5,567,355	1912....	25,863	142,025	11,146,811

Costs and recovery from ore treated for past 5 years are:

	1908.	1909.	1910.	1911.	1912.
Cost per pound (less gold and silver content)....	\$0.09996	\$0.09829	\$0.09048	\$0.11635	\$0.12855
Cost per ton, ore to metal sold	\$2.622	\$2.683	\$2.730	\$2.882	\$2.4596
Copper, per ton.....	17.8 lb.	17.7 lb.	18.0 lb.	16.4 lb.	13.6 lb.
Silver and gold, per ton....	\$0.985	\$1.03	\$1.23	\$1.133	\$0.762
Average price realized for copper	\$0.13504	\$0.1308	\$0.12778	\$0.1233	\$0.16664

Production 1913: Jan., 720,260 lbs.; Feb., 688,312 lbs.; March, 844,735 lbs.; April, 794,000 lbs.

The British Columbia Copper Co. has an immense tonnage of assured ore, very low in average tenor, with extremely low recovery of copper, comparing in this respect with the low-grade mines of Lake Superior, but with considerable gold and silver values to serve as a sweetener.

The company cannot earn much money from its Mother Lode mine unless copper sells above 15 cts. a lb., but with its new properties is reaching a point where a long and prosperous career is assured. The company has a remarkably sound and able directorate and its technical staff is of the highest grade.

BRITISH COLUMBIA EXPL., LTD.**BRITISH COLUMBIA**

Succeeded, Jan. 15, 1904, by Kamloops Mines, Ltd. Described Vol. V. **BRITISH COLUMBIA PHOENIX SYND., LTD. BRITISH COLUMBIA**

Secretary and offices: H. W. Batty, 4 Throgmorton Ave., London, E. C.; G. S. Waterlow, chairman; R. N. Crane, L. C. F. Robinson, F. A. Labouchere, C. K. Milbourne, directors. Company organized Dec. 9, 1911, in London, capitalization £5,000 in 100,000 shares of 1s. each; 62,030 shares issued and fully paid. Shareholders in the British Columbia Syndicate, Ltd., had the right of applying at par for 1 share for every fully paid £1 share held; 50,000 shares were underwritten by G. S. Waterlow for a commission of 5%, payable in fully paid shares.

Company has taken over the assets of the British Columbia (Rossland and Slocan) Syndicate, Ltd., and sundry shares, mining and other interests in British Columbia. The consideration was £1,969 in cash.

BRITISH MINING CO.**WASHINGTON**

Office: care R. M. Richards, Inc., 509 Bankers' Trust Bldg., Tacoma, Wash. Main office in England, but address unknown. Incorporated in Washington. Acquired the properties of the Puget Sound, Chelan & Spokane Railway Co., including the Skagit Queen Consolidated Mining Co. and the Thunder Creek Transportation & Smelting Co. Company is securing patent on 40 claims, comprising the Skagit Queen group. No development work at present, owing to difficulties of transportation. No securities for sale. Mining claims show 2 parallel veins, carrying bornite and other copper and lead minerals.

BROADWATER COUNTY MINING CO.**MONTANA**

Probably dead. Letters to Townsend, Broadwater Co., Mont., unanswered. J. J. Fisher, pres.; Jas. Marks, vice-pres.; Len Jobb, sec.; John A. Matthews, treas.; preceding officers and Albert Fisher, directors, at last accounts. Organized 1910, capitalization \$225,000, shares \$1 par. Lands, 7 claims, about 5 miles west of Townsend, on the Radersburg road, showing good outcrops and developed by pits and shafts of 18 to 60', cutting a vein of 4 to 12' estimated width, carrying chalcocite assaying up to 60% copper and 6 oz. silver per ton.

BROMIDE COPPER MINING CO.**NEW MEXICO**

Idle. Office: Bloomsburg, Pa. Mine office: Tusas, Rio Arriba Co., N. M. Lands, 42 claims, including the Pay Roll mine, opened to depth of 250', showing auriferous copper sulphides of good average tenor.

BRONZE MONARCH MINING CO., LTD.**WASHINGTON**

Merged in Mount St. Helens Consolidated Mining Co. Described Vol. X.

BROOKLYN ARIZONA MINING CO.**ARIZONA**

Office: 75 State St., Boston, Mass. Mine near Mayer, Yavapai Co., Ariz. Jas. A. Gerry, pres.; I. G. Miller, vice-pres.; Benj. G. Tuttle, vice-pres.; Percy B. Spofford, sec.; F. H. Knight, supt. Organized March, 1907, under laws of Maine, capitalization \$2,000,000, shares \$10 par, nonassessable; fully issued. Was promoted by the American Securities Co. Annual meeting, first Wednesday in April. F. E. Small and A. Calvin Cruchet, former president and treasurer, respectively, of the company, were indicted in Boston, May, 1913, by the Federal Grand Jury for using the mails to defraud, and both were arrested shortly afterward. F. E. Small has been general manager for several years, but an investigation in April by eastern stockholders resulted in a suspension of operations and indictment on 15 counts for promoting a fraud.

Property, 82 claims, about 1,600 acres, including the Brooklyn group of 14 claims, in the Squaw Creek district, about 20 miles southeast of Mayer.

Property carries auriferous and argentiferous copper sulphides. Very fully described and suspicious character pointed out Vol. X. Property shut down.
BROOKLYN MINING CO. **CALIFORNIA**

Idle. Mine office: Dale, San Bernardino Co., Cal. H. H. Ames, supt., at last accounts. Ores carry gold and copper. Has gasoline power and a 3-stamp mill. Closed down several years and apparently moribund.

BROOKLYN MINING CO.

NEVADA

E. S. Shields, sec.-treas.; 19 W. Granite St., Butte, Mont. Mine P. O.: Contact, Elko Co., Nev. S. V. Kemper, pres.; T. M. Hodgens, vice-pres. Organized in Minnesota 1898, capitalization \$500,000, shares \$1 par; 213,000 shares issued. Assessment of one-half cent per share due Jan. 13, 1912. Has no debts.

Property, 7 claims, 75 acres in the Contact district, with ore deposits occurring on the contact between limestone and porphyry. This ore belt is about 18' wide, runs east-west for several thousand feet, dips at 75° and is said to contain 8% copper, with about 2 oz. of silver and \$1 gold per ton.

Development is by 196' shaft with 600' of workings, developing 2,000 tons of ore. Property idle, waiting the advent of railway. Equipped with 25-h. p. boiler, 15-h. p. gasoline engine and hoist. Is 40 miles from railway.

BROOKS CONSOLIDATED COPPER CO.

MEXICO

Succeeded, 1909, by Cerrito Mining Co. Described Vol. VIII.

BROWN-ALASKA COPPER CO.

ALASKA

Address: 817 Alaska Bldg., Seattle, Wash. Formerly owned Mamie mine at Hadley, Prince of Wales island, Alaska. In liquidation. See Vol. X.

BROWN MOUNTAIN SMELTING CO.

COLORADO

Office: Denver, Colo. Mine office: Ouray, Ouray Co., Colo. W. E. Kreamer, pres.; P. J. York, vice-pres.; T. B. Crawford, sec.-treas.; G. S. Love, supt.; A. E. Ackerson, mine supt. Organized 1911, under laws of Colorado, capitalization \$300,000, shares \$1 par; issued, 280,000.

Property, the Hill, or Ouray smelter and the Guadalupe mine with 432 acres mineral land and 25-acre mill site in the Red Mountain district. The Guadalupe mine is reported to show an 18' vein of copper ore averaging 3% copper, 5 oz. silver and \$5 gold per ton in sulphide ore. Development aggregates 3,000', including a 2,000' tunnel and a 500' crosscut blocking out 50,000 tons of ore. Equipment at mine 350-h. p. water power.

Smelter, 250 ton capacity, is 6 miles from Ouray, has 2 blast furnaces of the Loder type turning out 40% matte, shipped to the Garfield smelter for further treatment.

Company reported to have closed contracts with Wanakah Mining Co. and the Rico Wellington and Rico Consolidated for 25 tons of ore per day each. The smelter was blown in, Oct., 1913.

BROWN WHITLOW GROUP.

ARIZONA

Mine address: Superior, Pinal Co., Ariz. Owned by J. C. Brown and J. W. Whitlow. Property, 5 claims, in Pioneer district, near Superior. Mine adjoins the old Silver King mine, once the richest silver property of Arizona. Development is by tunnel, which cuts a 7' contact vein of copper ore carrying low-grade and silver values.

BROWNELL-ARIZONA MINING & SMELTING CO.

ARIZONA

Mine office: Casa Grande, Pinal Co., Ariz. Lands, formerly held by Producer Mining & Smelting Co., are supposed to include the Jack Rabbit mine, 80 acres, in Pinal county, together with the Producer and Century-Chief group of 320 acres, and Index group of 220 acres, in Pima county, all in the Quijotoa mountains. Company sold stock, 1910, on the strength of a clever brochure written by Alfred Henry Lewis, the talented writer,

whose statements are not hampered by a knowledge of copper mining. The Jack Rabbit mine is generally understood to be owned by the Tube City Mining & Milling Co., whose relations to this company are not revealed. Company not favorably regarded.

BRUCE MINES, LTD.

ONTARIO

Office: St. Catharines, Ontario, Canada. Mine office: Bruce Mines, Algoma, Ont. R. W. Leonard, pres.; Alex. Longwell, vice-pres. and gen. mgr.; J. J. Mackan, sec.; A. B. Wilmott, cons. engr., 404 Lumsden Bldg., Toronto. Organized 1908, as successor of Copper Mining & Smelting Co. of Ontario, Ltd. Dormant.

Property is the old Bruce mines, freehold, discovered 1843, and worked extensively, 1846-76, producing copper to the value of about \$3,500,000. Lands are 65 acres of surface rights, and mineral rights to 12,800 acres, or 20 sq. miles, on Georgian bay, granted, 1854, from the crown. The mine has 6 known veins, practically parallel, of which 2, of 4 to 18', have been more or less developed, the principal vein, traceable 8,000', having a strike of N. 23° W., and of 18' maximum width, traversing diabase, carrying mainly chalcopryite, with some chalcocite, and quartz gangue, estimated by former management to average 5% copper, but run-of-mine ore ranges 2.5 to 5% copper. Development is by the No. 1 or Palmer shaft of 360', No. 2 of 450', No. 3 of 240', No. 4 of 244', No. 5 of 340', No. 6 of 270', No. 7 of 75', No. 8 of 200', No. 9 of 200', and No. 10 of 210'. Practically everything above the 360' level is stoped out. The waste heaps carry about 117,000 tons of discarded ore, estimated to average 1.5% copper, which perhaps is too high.

The Bruce Mines & Algoma railway, formerly under the same management as the mine, is a standard-gauge line, 10 miles long, that is equipped with a locomotive and 8-ton side-dumping cars. The extension of the railroad to Ridout on the Canadian Pacific railroad's main line, is reported to have been financed in England.

A 200-ton concentrator, 75x192' in size, 1½ miles from the mine, has an Austin crusher, 5 sets of rolls, 12 Hartz jigs, 18 Frue vanners, 2 double-deck slime tables and 18 sizers.

Miscellaneous improvements include a coal wharf, merchandise wharf, electric-light plant and telephone system.

Production of old mine, 1846-75, was 47,593 tons of ore and concentrates, yielding 19,125,920 lbs. fine copper. Property has changed hands repeatedly, but has secured no production since suspension, 1876, of the old company. The ore is rich but occurs in bunches and specks in a quartz gangue. The quantity is not great enough to insure large output and cheap costs. With flotation plant and economical management, property might be made to pay expenses and provide for new development.

BRUNER COPPER CO.; R. E.

ARIZONA

Office: 914 Commerce Bldg., Kansas City, Mo. Mine office: Patagonia, Santa Cruz Co., Ariz. Frank C. Peck, pres.; Roland E. Bruner, sec.; Robt. W. Waddell, treas.; Jas. R. Bent, supt. Organized under laws of Arizona, 1907, capitalization \$3,000,000, shares \$1 par, nonassessable; issued, \$2,320,000.

Lands, 15 claims, unpatented, area 300 acres, adjoining the Anaconda-Arizona Copper Co., and near the Mansfield mine. A 54' tunnel, on the Mescal claim, is said to give indications of lead-copper ore, and company claimed, Aug., 1908, to have opened a vein for nearly a mile in length, presumably by trenching, and then planned driving a tunnel of at least 500' length, on the Mescal claim.

BRUNSWICK CONSOLIDATED MINING CO.**NEVADA**

Mine office: Carson City, Ormsby Co., Nev. J. A. Yerington, pres.; Hon. R. K. Colcord, vice-pres.; E. B. Yerington, sec.-treas.; preceding officers, Geo. T. Mills and A. M. Ardery, directors; J. L. Hague, supt.; Emmett Boyle, cons. engr., at last accounts. Organized 1903, under laws of Nevada, capitalization increased, 1906, to \$1,000,000, shares \$1 par, non-assessable. Lands, 7 claims, 1 fractional, area 130 acres, in the Delaware district, 9 miles east of Carson City. Mine, opened to depth of about 200', has a contact deposit between diorite and porphyry, of 5 to 6' estimated average width, carrying auriferous and slightly argentiferous oxidized and sulphide copper ores, associated with hematite, with limestone gangue. Company financed with Montreal capital in 1910, but letters returned stamped "unknown" from former Montreal address.

BRUNSWICK MINING & MILLING CO.**COLORADO**

Mine office: Tin Cup, Gunnison Co., Colo. A. Lejune, supt., at last accounts. Property is the Jimmy Mack mine, carrying gold, silver and copper ores. Has steam power and a 100-ton concentrator. Presumably idle.

BRYAN MINING CO.**MONTANA**

Office: Wallace, Idaho. Mine office: Saltese, Missoula Co., Mont. Hon. Harry T. Day, mgr.; Chas. Burns, supt. Organized under laws of Delaware, capitalization \$1,000,000, shares \$1 par. Lands, in the Packer Creek district, show auriferous and argentiferous copper ore, developed by 2 tunnels, lower of 900', with 3,500' of workings; 150' raise from No. 2 tunnel to surface is said to show gray copper ore. Mine carries silver-lead ores, with some tetrahedrite, and had considerable ore developed, of promising grade.

BUCHANAN MINE.**CALIFORNIA**

Idle. Office and mine: Daulton, Madera Co., Cal. G. A. Pherson, owner. Lands, shortly south of the Green Mountain mine, and about 5 miles northeast of Daulton, show diabase and amphibolite schists, both mineralized, with 4 veins, of 4 to 9' width, carrying oxidized ores near surface and chalcopryite at depth. Development is by 5 tunnels, of 30', 60', 100', 120' and 500', and by two 200' shafts, 1 equipped with hoist and air compressor. Old tunnels are partly caved, and in bad shape. Mine has produced considerable ore, since discovery, 1865, and shipments made by lessees are reported to have averaged about 15% copper, 12 oz. silver and \$3 to \$4 gold per ton.

BUCHAN'S MINE.**NEWFOUNDLAND**

P. O.: Millerton, N. F. Wm. Scott, supt. Property is owned by the Terra Nova Co. and described under that name. This company is a subsidiary of the Anglo Newfoundland Development Co., which has a timber and mineral concession over about a million acres in the center of the island, near Grand Falls. Company has built largest pulp paper plant in the world and mining is merely a side issue.

BUCKEYE & CALUMET-ARIZONA MINING CO.**ARIZONA**

Mine office: Red Rock, Pinal Co., Ariz. Organized April, 1906, to develop copper claims in the Owl Head district. No trace of operations secured and probably defunct.

BUCKEYE COPPER & GOLD MINING CO.**ARIZONA**

Main office: New Philadelphia, Ohio. Mine office: Turkey, Yavapai Co., Ariz. Michael Siebold, pres.; Wm. Rommel, vice-pres.; Fred Graff, sec.; C. D. Grimes, treas.; other directors, A. W. Reiser, L. Hardman, Geo. Edel, M. M. Davis; Alvin Graff, mine supt. Organized July 24, 1912, under laws of Arizona, capitalization \$3,000,000, shares \$1 par, nonassessable;

issued \$1,790,000. Annual meeting, first Tuesday in September.

Lands, 35 claims, area 720 acres and a 20-acre smelter site, in 3 groups, 2 miles from Turkey, in Black Canyon district of Bradshaw mountains. Property shows chloritic schists and diorite, carrying fissure veins showing occasional native copper and malachite, but mainly azurite, chalcopyrite and bornite, estimated to average 4% copper, 3.5 oz. silver and from a trace to \$6 gold per ton.

The mine has a 726' two-compartment shaft on the Columbia claim, a 520' two-compartment shaft on the Sullivan claim, with 2 other 200' shafts and various pits of 10 to 40' depth and tunnels of 87' and 314', with about 5,000' workings. Equipment includes 15-h. p. and 40-h. p. gasoline hoists, a small air compressor and several mine buildings.

BUCKLAND MINING & DEVELOPMENT CO.

UTAH

Office and mine: Farmington, Davis Co., Utah. A. L. Buckland, pres.; Frank Jardine, vice-pres.; R. C. Buckland, sec.; David Moss, treas. Organized Feb., 1909, under laws of Utah, capitalization \$100,000, shares 10 cts. par, assessable. Owns Buckland mine, near Centerville; company also said to own 25 claims, unpatented, 3 miles from the railroad, showing 7 parallel fissure veins carrying copper and lead ore. Development by 3 tunnels, uppermost, No. 1, 300' long, cutting a 7' fissure vein opened by drifting for 100'; No. 2 tunnel, 90' long, connects with a shaft 60' below the collar; No. 3, 260' long and about 300' below No. 2. An old incline shaft sunk on vein is 240' deep. Property shows fair surface ores. Press notices suspicious and letters unanswered.

BUENA VISTA COPPER MINING CO.

ARIZONA

Mine office: Solomonville, Graham Co., Ariz. Has a 100' shaft, showing ore, and sent a sample shipment of 25% ore to El Paso smelter, 1903. Idle several years and apparently 'moribund.

BUENAVISTA MINING CO.

MEXICO

Letter returned unclaimed from former office, Pittsburgh, Pa. Mine office: San Francisco del Mezquital, Durango, Mex. Property is La Buena-vista copper mine and El Patrocino silver-lead mine, developed mainly by tunnel. Impossible to obtain information owing to the revolution.

BUFA MINING, MILLING & SMELTING CO.

MEXICO

Idle. Office: 709 Lankershim Bldg., Los Angeles, Cal. Letters unclaimed at La Bufa, Sahuaripa, Sonora, Mex. Wm. E. Richardson, pres. and gen. mgr.; Baron W. Riley, sec.; Lewis R. Richardson, treas., at last accounts. Organized 1902, under laws of Arizona, capitalization \$1,500,000, shares \$1 par. Has paid 5 dividends, last being \$60,000, July, 1905.

Lands, 123 acres, also a 10-acre mill site, and 5,000 acres ranch lands, showing 6 fissure veins, of which 2 under development average 4' width, opened by a 600' incline, said to give average assays of 10% copper, 10% lead, 4% zinc, 150 oz. silver and \$2.50 gold per ton, from argentiferous tetrahedrite and copper sulphides. Has shafts of 300' and 600', and a 225' tunnel, with 8,000' of workings and about 20,000 tons of high-grade ore blocked out, with a considerable amount of low-grade ore on the dump, for eventual treatment.

Machinery includes a 120-h. p. plant at the mine, with 2 hoists, 2 Rand air compressors and 7 power drills. Mine buildings include several small shops, a store, sawmill and about 20 dwellings.

The 35-ton concentrator has a small sampling mill attached. There also is a 20-ton leaching plant.

The smelter, at the mine, receives ore by gravity tram. Equipment includes 10-ton and 25-ton reverberatory furnaces, built of silica brick, made on the ground. Fuel is inferior wood, cut on the premises. Product is a

matte carrying 50% copper, 600 to 800 oz. silver and 1.5 oz. gold per ton, shipped, by burro, to Aguascalientes, via Guaymas, for refining, some rich ore being shipped also. Production, 1906, was about 750,000 lbs. fine copper.

BUFFALO & ARIZONA MINING CO.

ARIZONA

Letters unclaimed at Morristown, Maricopa Co., Ariz. W. H. Crandall, treas.; J. Harry Bennett, gen. mgr.; Henry G. Bennett, supt., at last accounts. Lands, in Bennett gulch, on lower Turkey creek, between Morristown and Hot Springs, have a 319' shaft, bottomed in chalcopryite assaying about 3% copper, 2 oz. silver and \$2 gold per ton. Mine has 3 levels, with about 800' of workings. Has steam and gas power, a 2-stamp mill with a 5,000-gal. storage tank, and 13 buildings. Shipped a \$4,000 bullion bar, June, 1908. Was building a mill and developing property, Sept., 1912, but closed down and property idle in 1913.

BUFFALO MINING CO.

MONTANA

Idle. Mine office: Saltese, Missoula Co., Mont. P. J. Conroy, pres.; Ole H. Linn, vice-pres. and mgr.; S. H. Linn, sec.; Paul Gerber, treas.; preceding officers, Michael H. Linn, J. Fleming, Geo. Dunham and Geo. W. Craddock, directors. Organized May 15, 1903, capitalization \$1,000,000, increased, 1907, to \$1,500,000, shares \$1 par.

Lands, 28 claims, 3 to 7 miles east of the Monitor mine, on Big creek, near the crest of the Bitter Root mountains, between Saltese and De Borgia. Property, hoped to carry the extension of the Monitor vein, shows 2 copper veins, with good outcrops, developed by a 600' upper tunnel, showing a little silver-lead and considerable copper, and by a 1,075' lower crosscut tunnel, with 25' of drifting on a copper vein carrying chalcopryite of 6 to 7% estimated copper tenor. Property considered promising.

BUFFALO SMELTING WORKS.

NEW YORK

Owned by Calumet & Hecla Mining Co.; at Buffalo, N. Y.

BULL CAMP MINING CO.

WYOMING

Office: Buffalo, Wyo. Mine office: Hazelton, Johnson Co., Wyo. F. A. Sparhawk, pres., treas. and mgr.; W. J. Davis, vice-pres. and sec.; preceding officers and Geo. Smith, directors. Organized 1903, under laws of Wyoming, capitalization \$500,000, shares \$1 par, nonassessable; issued, \$70,000. Annual meeting, Dec. 1, each year.

Lands, 5 claims, area 100 acres, showing mica-schist and felsitic granite, carrying several veins, of which 1, of about 2' width, developed by 5 pits of 10 to 15' and shafts of 36', 100' and 112', shows cuprite and chalcocite, giving assays of 25% copper and \$6 to \$8 gold per ton. Equipment includes a 45-h. p. hoist and 3 mine buildings.

BULLARD MINE.

ARIZONA

P. O.: Wenden, Yuma Co., Ariz. Lands, 5 claims, in Cunningham Pass, Harcuvar mountains, are said to show considerable ore assaying 7 to 10% copper and \$10 per ton in gold and silver. In Feb., 1913, mine was reported as shipping its ninth car of ore and in January, 18" of copper glance is said to have been opened.

BULLION BECK & CHAMPION MINING CO.

UTAH

Office: care U. S. Smelting, Refining & Mining Co., 55 Congress St., Boston, Mass., and Newhouse Bldg., Salt Lake City, Utah. Mine office: Eureka, Juab Co., Utah. W. M. Bradley, pres.; Jos. F. Smith, vice-pres. and treas.; C. E. Allen, mgr.; L. C. Doty, supt.; preceding officers, Frederick Lyon, Geo. W. Heintz, Philo T. Farnsworth and Jas. A. Cunningham, directors, at last accounts. Capitalization \$1,000,000, shares \$10 par. Dividends, to end of 1909, were \$2,738,400, last dividend being 10 cts., July 11, 1908. Company is a veteran of the Tintic district and a close corporation whose stock is mostly held by the U. S. S. R. & M. Co. through its owner-

ship of the Centennial Eureka Co., which holds a majority interest in the Bullion Beck & Champion Mining Co.

Lands, 3 claims, adjoining the Centennial-Eureka, which is under the same control, and with which sideline agreements stopping litigation were secured, 1908. Mine was discovered, 1876, and has been a producer since 1880.

Development is by a 1,300' shaft, with a 200' winze below the bottom level, the 1,300' level being wet, and by the Beck tunnel. Ore is mainly carbonate and chloride carrying varying copper values.

Equipment includes a 200-ton mill, with steam and electric power. Production, 1907, was 248 carloads of ore, or 12,000 tons, secured partly through work of lessees. Annual report of U. S. S. R. & M. Co., for 1912, states that development work on this property did not disclose anything of importance, but that a small force of men continues this work. Shipments for July, 1913, were 400 tons, and the large dump of low-grade ore from which shipments were made throughout 1913, had about 1,000 tons left in September. Part of the mine is leased, there being 25 men working leases.

BULLION MINE.

MONTANA

The Bullion mine lies at an elevation of 7,400' on the northwest side of Jack mountain, 10 miles by road from Basin. A concentrator and smelter of 200 tons daily capacity was constructed and several thousand feet of drifts and tunnels run, but the property is now idle.

Property contains fissure veins in Butte granite. Ore contains lead, zinc and copper sulphides with arsenopyrite in quartz gangue carrying tourmaline.

BULLION MINING CO., LTD.

IDAHO

Mine P. O.: Mullan, Shoshone Co., Idaho. William Squance, pres.; Jas. H. Taylor, sec.-treas. and mgr., Wallace, Idaho; John A. Klingman and Frank Taylor, directors. Organized 1902, under laws of Idaho, capitalization \$1,500,000, shares \$1 par; issued 1,180,837 shares; in treasury 229,812 shares, with 89,351 shares in reserve; 9 assessments, one-half cent a share, levied up to Nov. 1, 1912, yielding \$39,229. Receipts for year ending Nov. 1, 1912, were \$5,101, including ore sales of \$217 and assessment No. 9 of \$3,606. Disbursements mainly for labor and equipment.

Lands, 8 claims, 3 patented, area 160 acres, near Lookout, 2 miles from the Chicago, Milwaukee & St. Paul railway and 4 miles from Borax station, on the Northern Pacific line, on the Idaho slope of the Bitter Root divide, with a good wagon road to Borax. Property has a vein of 4 to 20' width, with average of 6 to 12', and nearly vertical dip, carrying shoots of copper ore, mainly chalcopyrite, with some bornite, associated with siderite, having a limestone gangue, ore being estimated to average 3.2% copper and 0.4 oz. silver per ton, with a trace of gold, with some ore of better grade.

Mine is developed by 2 crosscut tunnels, one 200' vertically above the other. The upper one has 130' crosscut and 186' drift on vein. Lower tunnel cuts a 28' vein 350' from portal, with 4' of solid ore. Orebody proved for 35' upward by raise and downward by shaft. Expenditures for 1911-1912 mainly for wagon road and equipment. Property now ready for underground development.

Equipment includes steam power, a 12-h. p. hoist and a 5-drill Ingersoll-Rand air compressor; total cost of equipment \$7,903.

A trial shipment of 24 tons to the East Helena smelter, Sept., 1912, showed 56% copper and 1 oz. silver per ton. Concentration tests on 5.2% ore showed a 73% recovery, the concentrate carrying 17.6% copper. A contract for diamond drill work on the orebody was let Sept., 1913.

BULLY HILL CAVE MINE.**CALIFORNIA**

Idle. Address: Alden Anderson, owner, Redding Nat'l Bank, Redding, Cal. Mine at Copley, Shasta Co., Cal., known as the Michigan group, adjoining the Bully Hill mine. Formerly owned by Bank of Shasta County, and leased under bond March, 1912, to Bully Hill Cave Mining Co. Sold, Nov., 1911, to present owner.

BULLY HILL COPPER MINING & SMELTING CO.**CALIFORNIA**

Office: 30 Church St., New York. Mine P. O.: Winthrop, Shasta Co., Cal. John B. Keating, First Nat'l Bank Bldg., San Francisco, Cal., pres. and mgr.; L. B. Judson, vice-pres.; M. F. Westover, sec.; Herbert R. Hanley, asst. mgr.; preceding officers, A. H. Jackson, A. W. Burchard, D. M. Riordan and G. F. Morrison, directors. Organized 1900, under laws of New Jersey, capitalization \$2,500,000, shares \$25 par, reduced 1905 to \$1,000,000. Bonds, \$400,000, issued for construction of Sacramento Valley & Eastern railroad, stock of which is owned by the Bully Hill. Is controlled, through practically entire stock ownership, by the General Electric Co., Schenectady, N. Y.

Owens the Bully Hill and adjacent mines, 23 claims, 18 patented, area 213 acres, in the Pittsburgh district, 25 miles northeast of the Iron Mountain, Balakala and Mammoth mines, and supposedly in the same general geological horizon. Property includes the Bully Hill, Rising Star and Copper City groups, connected properties, except the Copper City, 3 miles southwest of the Bully Hill, with an unworked interval between the Copper City and Rising Star groups. The Bully Hill property was opened as a gold mine, paying well as placer ground, and afterwards working the gossan with rather indifferent results, until copper ores were developed at slight depth.

Bully Hill has a diameter of about 4,000', rising 1,200' above the stream levels of the surrounding country, and is composed of eruptive rocks, mainly basalt and rhyolite, with 3 mineral zones, having a strike of approximately north and south, ore occurring in big lenses in shear zones in rhyolite and meta-dabase dikes, all of superficially slaty structure, lenses having a clay gouge of 1 to 30' on 1 or both walls. Main lenses have stringers and feeders, ranging from a few inches to 30' in width, the principal lenses being 20 to 300' long and 2 to 40' wide, with average width of about 30', opened to depth of 1,000', carrying ore of 2 to 30% copper tenor. The zone of secondary enrichment shows about 10' of bonanza ore, the main orebodies below carrying chalcopryite, associated with pyrite, also a little bornite and chalcocite, with occasional oxidized ores and native copper. The best orebody gives average assays of about 15% copper, 6 oz. silver and \$8 gold per ton, and shows native copper and native silver in considerable quantities on the 670' level, the average copper tenor of the mine being about 5% with combined gold and silver values up to \$25 per ton.

The Bully Hill group is opened above tunnel No. 3 by crosscut tunnels of 600', 800', 1,000' and 1,200', giving a back of about 300'. No. 3, the main working tunnel, 1,000' long, has double tracks and a 100x100' underground station containing powerful pumps and double-drum electric hoist for the 3-compartment 970' blind shaft starting from this point.

The equipment includes steam and electric power aggregating 300 h. p. at the mine, and 350 h. p. at the smelter, the mine having four 100-h. p. hoists, good for 1,000' depth each, and 3 Rand air compressors, of 14 drills aggregate capacity. Buildings, about 20 in number, include a 40x50' iron-sheathed machine shop.

The Rising Star group of 5 claims, also known as the Anchor, Excelsior and Northern Light mine, has a 900' three-compartment shaft, with

double-drum electric hoist, and works the 6th and 7th levels, which show considerable good ore.

The Copper City group, 4 claims, area 70 acres, is opened by an upper tunnel of 150' and a lower 1,000' tunnel, started about 1863, by Capt. J. R. DeLamar, and is said to show a 20' body of solid sulphide ore, strongly zinciferous. The Winthrop mine, of the Copper City group, has a 16' vein of ore, of fair copper tenor. Last developments, 1910, were on the Copper City group.

The smelter, about one-half mile from the mine, receives ore by the Bully Hill railroad, a 4-mile standard-gauge private line having a 65-ton Baldwin locomotive. The smelter, remodeled 1907-08, has about 250 tons daily capacity, fuel being mainly coke, supplemented by petroleum for the reverberatory. The furnace building is 39x310', with a 90' stack, and is terraced throughout, handling all material by gravity. The calcining department has roast stalls, in series, with 2 McDougal circular calcining furnaces. There are two 42x120" rectangular water-jacket blast furnaces, and a 50-ton reverberatory for treating fines and flue dust. First-fusion product is a matte of 35 to 50% copper tenor, taken in ladles, by electric traveling crane, to the converter department, which has 2 stands, with 68x96" shells of barrel type, turning out blister copper of 99% tenor, shipped to the DeLamar works at Chrome, N. J., for electrolytic refining. Limestone and iron ore for fluxing are obtained from quarries on the McLeod river, 6 miles distant, but there is a scarcity of suitable ferruginous copper ores for fluxing the high-grade sulphides of the Bully Hill mine.

Smelter was closed down, July 1, 1910, and forces at the mines reduced, owing to trouble over fumes, the federal forest service alleging damage to trees. Ore production is shipped, under contract, to the Balaklala smelter, the Copper City group being the principal producer.

Company built a small experimental plant at Delamar, Cal., to try out electric smelting and recovery of zinc values. The ore has also been tested by the Minerals Separation Co.'s flotation process with favorable results.

The Sacramento Valley & Eastern railway, 17 miles long, controlled by the company, completed, 1907, at a cost of \$500,000, runs from Winthrop to a connection with the Southern Pacific, at Pitt, 3 miles from Kennett, running through Heroult and Copper City.

Annual production, formerly about 5,000,000 lbs. fine copper, was about 3,250,000 lbs. in 1908, and 4,000,000 lbs. in 1910. The Bully Hill is perhaps the highest grade copper mine in California, with an experienced and capable management. It will undoubtedly be reopened when a satisfactory solution of the "fume" problem has been found.

BULLWHACKER COPPER CO.

MONTANA

Office: Suite 216, 53 Wall St., New York. Mine P. O.: Butte, Mont. Patrick Clark, pres.; J. J. Stewart, vice-pres.; W. C. Meyer, sec.-treas.; John Bresnahan, supt. Organized March 20, 1906, under laws of Arizona, capitalization \$1,000,000, shares \$1 par. Paid 2 monthly dividends of 1 ct. each per share, early 1907.

Lands, 1 claim, lying east of the Pittsburgh & Montana, have a 400' shaft and open cut or quarry 300x500' with incline shaft to bottom, 75' below surface. This open pit shows the ore to be 150 to 200' in width, averaging about 3.5% copper, with practically no gold or silver values. In 1906, lessees produced 6,228 tons of silicious ore, averaging 4.97% copper, extracted from depths of less than 100', and company itself produced nearly an equal amount of ore, giving production estimated as equal to 850,000 lbs. fine copper. Shipments ceased latter end of 1907. Work was resumed

in Feb., 1912, and lessees shipped 12,227 tons, averaging 4.29% copper, to the Washoe smelter, in that year.

The property was explored by crosscuts and drifts at a depth of 400' in 1911, but no payable ore found beneath the big body of chrysocolla ore mined by open-cut work. Recent work by the lessees has demonstrated this orebody to be very much larger than formerly believed and the leasers, mining 200 tons per day in 1913, blasting large tonnages to pit floor, loading into a skip and hoisting up 100' incline shaft, were said to be making \$35,000 a month.

The ore is slightly altered Butte granite (quartz monzonite), stained green throughout by chrysocolla and having seams and bunches of this and other copper minerals, especially the black oxide of copper.

A 50-ton experimental leaching plant erected in the winter of 1912-13, only in operation a few days, has been enlarged to 200 tons daily capacity, the success of the Butte-Duluth plant, one-fourth mile to the south, proving the feasibility of the method of treatment. The Bullwhacker ores require, however, a much longer digestion in acid, owing to the predominance of the copper silicate instead of the carbonates. The cost of electrolytic precipitation is also as yet an uncertain factor, and not yet proven cheaper than the use of scrap iron for this purpose.

The lease on the mine expired Sept. 25, 1913, and the company is now working the mine on its own account. According to Mr. Clark, who owns the controlling interest (80%), 1,000,000 tons averaging 3½% are said to be developed; while the existing workings do not permit a measurement of this amount; there is reason to believe this tonnage may be realized.

BUNKER HILL MINING & SMELTING CO.

WASHINGTON

Office: 1123 Broadway, New York. Mine office and works: Reiter, Snohomish Co., Washington. Chas. G. Reiter, pres.; Augustus M. Price, vice-pres.; John D. Campbell, sec.; Le Roy B. Sherman, treas., and Chas. W. Hendricks, mine mgr.; preceding officers, J. E. Bowman, A. W. Avery, Wilbur Morris, A. G. Brinkerhoff, T. A. Mead, L. H. Nash, Eric T. Christensen and Manfred Rockefeller, directors. Organized Oct. 24, 1902, under laws of Maine, original capitalization \$3,000,000, shares \$1 par, reduced, March 23, 1908, to \$1,500,000, and afterward increased to \$2,000,000, shares \$1 par, in \$1,500,000 common stock and \$500,000 cumulative 8% preferred stock, latter to provide for payment of bonds, second mortgage notes and script notes. Annual meeting, last Tuesday in October. Was the successor of Bunker Hill-Sullivan Copper Mining Co.

Property, 18 claims, area 343 acres, known as the Copper Bell group on Bald mountain, one-half mile from Reiter station, Great Northern railroad, and 5-acre mill site, on May creek below Lake Isabel. Mineral claims show 9 fissure veins in granite and a contact deposit between granite and diorite. On the Copper Bell group, diamond drilling was done in 1907-09, one hole going through 26' of copper ore averaging 7%. Development is by shafts of 86' and 600' with about 1 mile of workings, showing orebodies of various widths carrying chalcopyrite averaging 1% copper, 0.5 oz. silver and 40 cts. gold per ton. Company also owns 3 claims, area 40 acres, located at mouth of Lake Isabel, about 1¼ miles northeast of the Copper Bell group. Equipment includes a 110-h. p. hydro-electric plant, taking water from Lake Isabel, 2 hoists, a 10-drill Ingersoll-Sargeant duplex air compressor, and an electric light plant. There are a number of mine buildings. The mill enlarged, 1907, 100 tons, has Blake and Austin crushers, rolls, Wilfley tables, slime tables, buddles and magnetic separator. A 50-ton oil-burning smelter was blown in, July, 1908, for a short period only.

Production during 1906-08, inclusive, valued at \$7,500. Since 1908 no work has been done except that which was necessary to hold the property by possessory rights.

Patents expected to be obtained by summer of 1913.

BURLINGTON-NEVADA COPPER CO.

NEVADA

Office: Yerington, Lyons Co., Nev. Property at Mason Pass, a few miles from Yerington, comprises a group of claims developed by a 100' shaft, from which ore is being shipped to the Wabuska smelter, 1913. Equipment includes a gasoline hoist.

BURRO MOUNTAIN COPPER CO.

NEW MEXICO

Office: 99 John St., New York. Mine office: Leopold, Grant Co., N. M. Dr. Jas. Douglas, pres.; Jas. McLean, vice-pres.; Geo. Notman, sec.-treas.; E. M. Sawyer, supt. Organized 1904 under laws of New Mexico, capitalization \$50,000, increased, 1906, to \$100,000, shares \$1 par. Owned by Phelps, Dodge & Co. Balance sheet, Dec. 1, 1912, showed cash, etc., \$74,134, mines and mining claims, \$1,919,477; plant, \$219,270; miscellaneous, \$11,079, with deficit for 1912 of \$84,105, balance of \$357,414. Accounts payable, \$14,242; pay rolls, \$3,304. Reserve against Chemung property, \$1,290,000; capital stock, \$160,000. Total, \$2,223,961.

Lands, 60 claims, area 1,000 acres, formerly held on bond and lease, but bought, 1906, from Southwestern Copper Co. The Newsboy and Niagara claims were added, 1909. Property shows 36 porphyry dikes, all carrying silicates giving assays of 10 to 25% copper, 5 orebodies being developed.

The old mine, 15 claims, known as the St. Louis, is said to have produced upwards of \$1,000,000 worth of ore, under former ownership, shipping ores ranging 15 to 25% in copper tenor.

The property is developed by 5' shafts, the Sampson, St. Louis, McKinley and Boston shafts, each more than 200' in depth, developing the Sampson and St. Louis veins laterally for more than 2,000', these workings being estimated to show more than 3,000,000 tons of ore, with approximately 2,500,000 tons blocked out, assaying 3.4% copper, ore being mainly chalcocite, without appreciable precious metal values. The 500' Newsboy vertical shaft, started 1909, is east of the former main workings. The mine has about 5 miles of workings on the 2 veins, the Sampson orebody being 100 to 200' in width, about 1,000' in proven length, and of 300' proven depth. Mine is worked largely on the caving system, obviating excessive timber requirements. Equipment includes electric hoists and pumps, and a steam hoist at the Sampson shaft. When purchased the property had 2,000,000 tons of 3% ore developed.

Lands include a town site, improved with waterworks, electric lights and substantial buildings, including a hotel and numerous dwellings.

The 1912 work consisted mainly in completing the development of orebodies that were already partially known. This has increased the estimated ore reserve by approximately 47,000 tons, averaging a little better than 2% in copper. This increased tonnage lies in the vicinity of the St. Louis fault on the 5th level, which is somewhat deeper than most of the ore previously developed.

The proportion of ground only partially explored is not more than 10% of the company's territory, all of which possesses favorable indications from a geological point of view. The ore already blocked out justifies the erection of a large concentrator, two 500-ton sections of which are being planned.

As preliminary work the 2 mines (formerly the Burro Mountain & Chemung), now owned by this company, are being united by the Niagara haulage tunnel between Leopold and Tyrone. Starting at the Tyrone ter-

minus of the proposed Burro Mountain railroad, this tunnel, 8x9', will be driven to Leopold, a distance of approximately 1 mile, and being on a lower level than most of the present mine workings and ore developed at Leopold, it will serve the double purpose of drainage and haulage.

The old concentrator, built 1905 and twice remodeled, is being dismantled. A 10-ton smelter, of antiquated design, left by former owners, is idle and worthless. A standard-gauge 18-mile spur will be built in 1913, at a cost of \$350,000, from the main line of the Santa Fe railroad to the mine and mill. Labor is almost exclusively Mexican, only the bosses being Americans. Work on the new 1,000-ton concentrator to be erected at Tyrone, will be started as soon as the railway line is completed.

Production, to end of 1907, was about 15,000,000 lbs. fine copper. Property considered decidedly promising, and management is of the best.

BUTCHER BOY MINING CO.

WASHINGTON

Letters neither answered nor returned from Greenwood, B. C., or Chesaw, Okanogan Co., Wash. Lands, in the Myers Creek district, slightly developed, carry auriferous copper ore of fair assay tenor. Equipment includes a small steam plant. Work was being done on the 100' level in June, 1911, under the direction of John Benson, one of the owners. Presumably idle.

BUTTE-ALEX SCOTT COPPER CO.

MONTANA

Office: 402 Palladio Bldg., Duluth, Minn. Mine office: Butte, Silver Bow Co., Mont. N. F. Hugo, pres. and mgr.; W. P. Heimbach, vice-pres.; Thos. Furniss, sec.-treas.; preceding officers, Reynolds Clough, W. D. McKeefrey, F. C. Laird, John Joy Edson, Jr., P. J. Bennetts, Jas. T. Fisher, Thos. A. Merritt and W. B. Chapman, directors; Chas. J. Stone, supt. and mg. engr. Organized Feb. 5, 1909, under laws of Delaware, capitalization \$1,250,000, shares \$10 par; issued, 74,309. Was a reconstruction of Butte Montana Mining Co., giving 50,000 shares of full-paid stock to the Butte Montana for its property and is said to have begun business with \$100,000 cash. Property was taken over April 10, 1909. Fidelity Title & Trust Co., Pittsburgh, Pa., registrar; Colonial Trust Co., Pittsburgh, transfer agent. Stock is listed on the Pittsburgh, Butte and Duluth stock exchanges. Annual meeting, second Tuesday in July. Dividends paid 1912, \$74,199.50 or 50 cts. a share quarterly. Total dividends to Aug., 1913, \$111,354.

Lands, 2 claims, 1 fractional, area 25 acres, known as the Little Annie and Alex. Scott claims. The Little Annie, area 20 acres, lying between the Goldsmith and Little Georgia claims, northwest of Walkerville, is a silver property having old workings, sunk many years ago, that include a 200' incline shaft, with some drifting. Property is supposed to carry the northern branch of the Alice vein, which splits in going west, the Little Annie having the northern branch about 3,000' west of the Alice Co.'s. westernmost claims. The Little Annie mine is filled with water, and idle some years.

Principal property is the Alex. Scott, a fractional claim of 4.52 acres area, in Meaderville, adjoining the West Colusa mine on the north. The Alex. Scott claim carries about 800' of the strike of 4 veins and is developed by a 2,000' shaft. The 500' level is said to show a vein 28' wide, carrying 3 seams of ore, one of 2' width, being high grade. Ore is blocked out on the 1,200', 1,500', 1,600', 1,800' and 1,900' levels. Ore shoot on 1,800' level is 300' long. On the 2,200', development from the West Colusa mine has proved an orebody 30' thick of bornite and glance. Company sold that portion of its orebody surrounding the West Colusa shaft for a width of 25' on either side and a length of 75' to the Anaconda Copper Mining Co. They will receive \$535,000 of which \$30,000 has already been paid, and the Anaconda Co. has agreed to waive forever the right to bring suit on any

apex question. Company is now shipping about 250 tons a day, most of it coming from the 500' and 600' levels, that averages 6% copper, 2 oz. silver, with slight gold values.

Equipment includes a Nordberg double 18x36" hoist, good for a depth of 3,000', and an air compressor. Buildings include a boiler house, compressor house and 300-ton ore bins, smithy and office.

Production for 1912 was 55,894 tons of ore, averaging 6% copper. Estimated production for 1913 is 60,000 tons. Earnings for Jan., 1913, were \$27,426 from 5,000 tons second-class ore yielding 468,096 lbs. copper and 1,990 oz. silver.

The Little Annie, in the zinc belt, is as yet of problematical value, but the Alex. Scott, though small, is a very rich claim, being located in the heart of the district and surrounded on 3 sides by fine mines. Is a valuable property, well managed and ought to be a dividend payer for many years.

BUTTE-ARGENTA COPPER CO.

MONTANA

Idle. Letters neither returned nor answered from Butte or Argenta, Beaverhead Co., Mont. J. P. Oppenheimer, pres.; John F. Cowan, mgr. J. H. Tonkin, supt. Organized Feb. 12, 1906, under laws of Montana, capitalization \$3,000,000, shares \$10 par. According to statement, Jan. 1, 1910, liabilities were \$25,650.

Property, 12 miles west of Dillon, known as the Iron Mountain mine, has a tunnel and 2 shafts, opened to a depth of 200' on a wide vein of argentiferous silver-lead and copper ore, having streaks assaying up to 16.5% copper and 30 oz. silver per ton. Upper levels were worked, years ago, for silver-lead, which changed to copper at slight depth. Equipment includes a 125-h. p. hydro-pneumatic power plant, with Pelton wheel, and an 8-drill Ingersoll-Rand air compressor.

BUTTE & ARIZONA COPPER MINING CO.

ARIZONA

Office: 619 Hennessy Block, Butte, Mont. Mine near Hereford, Cochise Co., Ariz. B. H. Dunshee, vice-pres.; A. S. Nichols, sec.; John C. Adams, treas.; preceding officers, L. O. Evans, Chas. S. Shoemaker, A. P. Henningson, C. B. Mosely, John E. Corette and D. M. Watts, directors. Capitalization \$1,250,000, shares \$1 par.

Property, 14 claims, 11 patented, costing considerably over \$60,000, was exchanged for \$450,000 stock. Property is in the Huachuca mountains, 35 miles southwest of Bisbee, and about the same distance north of Cananea.

Property shows an ochrous gossan of 10 to 300' width, covering a contact vein between syenite and limestone carrying occasional copper oxides, carbonates, pyrite and argentiferous gray copper, and chalcocite of fair tenor, though not in large quantities. Development is by a long main tunnel cutting several small veins giving assays up to 18% copper with an average of 4.5% tenor, mine having upwards of 3,900' of workings. Main vein 350' from mouth of tunnel is claimed to show 39' of 6% chalcopyrite, which is an overestimate. Nearest railroad is 15 miles, with a fair wagon road. Has steam power and air compressor. Idle since end of 1908. Company has no debts, considerable treasury stock and is being carried by the directors who are advancing the money required to pay taxes and maintain the property.

BUTTE & ARIZONA COPPER MINING CO.

ARIZONA

Office: 826, I. W. Hellman Bldg., Los Angeles, Cal. Mine near Mayer, Yavapai Co., Ariz. Ernest A. Haggott, pres.; Emil J. Baxter, vice-pres.; Thos. C. Job, sec.; M. B. Hazeltine, treas.; preceding officers and B. O. Kendall, directors; Warren G. Davis, supt. Organized June 6, 1905, under laws of Arizona, capitalization \$5,000,000, shares \$1 par, nonassessable; issued, \$2,200,000. Annual meeting, first Monday in May.

Lands, 9 claims, unpatented, area 180 acres, also 160 acres in the Big Bug district, showing Algonkian schist, quartzite and pyrite, carrying 3 ore-bodies, 2 partly developed, occurring as replacements in chloritic schist, and as contact deposits between hornblende-schist and quartzite. The main vein, of 40' estimated width, traceable 4,800', is developed by shafts of 75', 120', 175' and 300' and a 400' tunnel, with about 1,900' of workings, showing chalcocopyrite ore, estimated to average 2.5% copper, 2 oz. silver and \$2 gold per ton.

Additional shaft sinking in 1911-12, having proven that the zone of ore that might be profitably concentrated is too shallow to be of commercial importance, the property will probably be abandoned.

BUTTE & BACORN MINING CO.

MONTANA

Office: 53 Silver Bow Block, Butte, Mont. Pittsburgh office: Commonwealth Bldg. Chas. Hyde, vice-pres.; Geo. I. Whitney, treas.; H. H. Robinson, Fulton Bldg., Pittsburgh, Pa., sec.; J. B. Finley, W. B. Shiras, D. Leet Wilson, E. M. Byers, W. H. Patterson, Chas. Hyde, H. H. Robinson, Chas. W. Brown, directors; H. C. Bacorn, mgr. Organized Feb. 12, 1906, under laws of Maine, capitalization \$5,000,000, shares \$1 par, fully paid, nonassessable; 4,000,000 issued. Bonded for \$50,000 at 6% of which \$40,000 is issued. Union Trust Co., transfer agent, Pittsburgh, Pa.

Controlling interests were, and still are, held by strong Pittsburgh men; but the company's fiscal agents, Whitney & Stevenson, failed during the panic of 1907, and the company lost its working capital. Work was then stopped and has not since been resumed.

Company owns in fee simple 23 claims, area 278 acres, in the northeastern part of the Butte district, about 1 mile north of the Black Rock and Badger State mines. Has 1 shaft, the Belinda, 840' deep.

The so-called Calumet ground, consisting of 3 claims, with an area of 46 acres, on which there is a shaft 1,000' deep, was held by the company under contract of purchase; but in 1907, default was made in payments and ground reverted to original owners. It has lately been acquired by F. W. Bacorn, formerly president of the company and associates, whose interests are closely allied with those of the company.

No exploration was done from the Belinda shaft, but work had been commenced in the Calumet shaft and promising veins encountered, though no pay ore was struck up to the time of the shutdown. The geology is to all appearances identical with that of the producing parts of the Butte district.

BUTTE-BALLAKLAVA COPPER CO.

MONTANA

Office: Sherwood Bldg., Duluth, Minn. Mine office: Butte, Silver Bow Co., Mont. I. Freimuth, pres.; A. L. Warner, vice-pres.; John A. Percival, sec.-treas.; Millie Bunnell, Gus Carlson and Geo. C. Swallow, directors; Walter Harvey Weed, cons. engr.; Chas. W. Newton, supt. Organized April 2, 1907, under laws of Arizona, capitalization \$2,500,000, shares \$10 par, nonassessable; fully issued. Listed on Boston Stock Exchange. Paid a 50-ct. dividend, Aug. 1, 1910. Boston Safe Deposit & Trust Co., transfer agent; Federal Trust Co., Boston, registrar. Has upwards of 1,200 shareholders.

Property comprises the Burke and Ballaklava claims, about 6½ acres in eastern part of Anaconda hill, adjoining Mountain Chief, Modoc and High Ore mines of the Anaconda Copper Co. Property willed to Bishop Carroll of the Catholic Church who sold it for \$400,000 cash to this company.

The claims are on the northeastern slope of Butte hill. Owing to the peculiar shape of the tract, which is 1,860' long on the course of the vein sys-

tem, it carries the outcrops of several veins with an aggregate of about 3,600' of their strike. By reason of this peculiar situation, the property is as valuable for mining purposes as a tract of many times its area, the law permitting one to follow down any veins outcropping in the ground which pass through the end lines of the claim. The veins, numbered 1 to 5, include 3 veins of importance. The surface is covered by wash, but the veins have been exposed by trenching and several railroad cuts.

The Burke vein crosses the claim of that name and has been worked in the Modoc mine. The working shaft is sunk on the Clymo vein, exposed in the shaft from the surface downward. The Ballaklava, Nelson and other veins are extensively developed.

The Butte-Ballaklava line is 640' from the North Butte mine. The Mountain Chief mine of the Anaconda, immediately to the north, was a small producer, under the management of F. A. Heinze.

The mine workings are extensive, the levels being 100' apart and driven from the 1,600' three-compartment shaft. The mine has been connected on the 800' level, for ventilation and safety, with the Modoc mine of the Anaconda, and on the 1,200' level with the West Colusa. This crosscut is used for drainage. The veins on the 100' and 300' levels show ore carrying 5 to 8.5% copper and 45 to 60 oz. silver per ton, from which small shipments have been made. The 500' level shows pyrite and a little high-grade silver ore, and the 700' level shows stringers of massive bornite, pyrite, glance and some chalcopyrite, all argentiferous. Principal ore values are shown in the Ballaklava vein on the 800 to 1,400' levels, inclusive, ore being mainly chalcocite, carrying good silver values. This vein ranges up to 34' in width, carrying rich ore on the 800' level; the 1,200' level shows the vein up to 20' in width, with ore averaging 4 to 4.5% copper, and the 1,400' level carries 9' of chalcocite and bornite of about 7.5% average copper tenor. This vein has been stoped westward to the workings of the High Ore mine, whose stopes are continuous with those of the Butte-Ballaklava mine.

Electric power is used throughout, an auxiliary steam plant being held in reserve for emergencies. Equipment includes a double-drum Lake Shore hoist, operated in counterbalance, driven by a 300-h. p. General Electric motor, designed to hoist an unbalanced load of 5 tons, at a speed of 800' per minute, from a depth of 3,000'. There also are a 165-h. p. auxiliary double-drum hoist, good for 1,500', and a 10x12" auxiliary steam hoist, 2 Ingersoll-Rand air compressors, with cross-compound air cylinders, each driven by a 100-h. p. General Electric motor, and an electric station pump. The auxiliary steam plant includes a cooling tower for water.

Buildings include an engine house, office with warehouse on the ground floor, carpenter shop, smithy, and a 30x50' steam-heated changing house.

Production was begun April, 1910, and continued until stopped by injunction, granted the Anaconda Copper Co., in Aug., 1910. During this period shipments to the Pittsmont smelter were about 125 tons daily, of ore assaying about 8% copper and 12 oz. silver per ton, this being the highest average grade of ore produced by any Butte mine for that year. Production, July, 1910, was 662,838 lbs. fine copper and 44,072 oz. silver and for the second quarter of 1910 was 1,561,953 lbs. fine copper and 105,608 oz. silver. Total production was 2,428,346 lbs. copper, 164,811 oz. silver and 42 oz. gold, giving net smelter returns of \$205,000, in 1910.

The Anaconda Co. is alleged to have cast covetous eyes on this property from the time the present company acquired it, and started litigation in 1908. The first suit was brought by the Butte, Anaconda & Pacific railroad, a subsidiary of the Amalgamated Copper Co., which had been granted right-of-way across the Butte-Ballaklava property, and claimed title to the

ore underneath, but a flaw in the title was discovered and the railway company dropped suit, being satisfied to retain the right-of-way. This was followed by action started by the Anaconda Copper Mining Co., which secured a temporary injunction, Aug. 22, 1910, from Judge McClernan, at Butte, which was made permanent Jan. 24, 1911, restraining the Butte-Ballaklava from extracting ore from the Ballaklava vein, formerly called the Edith May by the Butte-Ballaklava, but which the Anaconda claims to be the Mountain Chief vein, apexing on the Mountain Chief claim of the Anaconda, to the northward. The Anaconda Co. claimed that ore was extracted illegally from both the Mountain Chief and Right Bower claims, and filed suit for \$1,800,000 damages against the Butte-Ballaklava therefor. The defense reserved its case for the real trial of the suit. This suit was compromised Nov. 28, 1913, by a division of the orebody in dispute, and the withdrawal of all accessory suits and charges.

BUTTE & BASIN COPPER MINING CO.

MONTANA

A. P. Bowie, secretary, State Savings Bank, Butte, Mont. Issued capitalization Jan. 1, 1909, \$207,001; liabilities in 1913, \$200. Owns 4 patented claims, fractional, covered by granite and limestone, in Jefferson county, Mont. Development sufficient to prove up for patenting. Property said to have ore in sight, but not enough to justify working it at present. Company worked a lease on adjoining claim until expiration of same, then levied assessments to complete work for patenting of its own claims.

The former president reports that the company has had no meeting to his knowledge for 3 or 4 years and does not know who the present officers or directors are.

BUTTE & BOULDER MINING CO.

MONTANA

Idle many years. Office: Butte, Mont. Mine office: Boulder, Jefferson Co., Mont. Lands, 2 claims, held under bond and lease, having a 750' tunnel, expected to cut, at depth of 500', a vein carrying argentiferous and auriferous copper and lead ores.

BUTTE-CABLE COPPER & GOLD MINING CO.

MONTANA

Office: Anaconda, Mont. Louis Feldman, pres.; Nicholas Bossonitz, vice-pres.; preceding officers, Jas. McMasters, Wm. Henthorne and John Strasser, directors. Organized Nov. 21, 1906, under laws of Montana, capitalization \$1,000,000, shares \$1 par. Lands, 6 claims, 4 patented, 15 miles west of Anaconda, near Cable Consolidated Mining Co., showing a 3 to 4' vein carrying about 2' of commercial ore, giving assays of 11.9% copper, 156 oz. silver and 0.6 oz. gold per ton. Property closed down. Sullivan and Peterson, of Anaconda, offering stock at 15 cts. a share, Feb., 1913, to raise money for patenting claims.

BUTTE CENTRAL COPPER CO.

MONTANA

Wm. G. Burns, secretary, 27 State St., Boston, Mass. Mine office: Butte, Mont. Sir Frederick W. Borden, chairman of the board; Wm. H. North, pres.; John A. Condy, vice-pres.; Joseph J. Wall, vice-pres.; Willard E. Robinson, treas.; preceding officers, Henry M. Pellatt, Hon. Rodolphe Forget, Wm. R. Tillinghast, Dr. Havelock H. Hanson, Jas. R. Simpson, Freeman I. Davidson, Geo. H. Cragin and Harry W. Davis, directors; John E. Rothwell, mill supt.; Samuel McConnell, supt.

Organized Dec., 1908, under laws of Delaware, capitalization \$2,500,000, shares \$10 par, nonassessable; fully issued. Was practically a reconstruction of the Butte Central Copper Mining Co., which was affiliated with the Butte Central Copper Co., Butte Central Copper Mining & Smelting Co., and Butte Central & Boston Copper Corporation. Stock is listed on the Boston curb. First National Bank, Boston, registrar; Federal Trust Co., Boston, transfer agent. Annual meeting, second Wednesday in February.

Company claims to have spent \$240,000 for development and construction in 1911 and 1912 besides \$80,000 for a mill, a Canadian syndicate headed by Mark Workman, Sir Rodolphe Forget, Sir Henry Pellatt and Sir Frederick Borden, supplying \$200,000. Company has \$150,000 income bonds outstanding.

Owens the Ophir mine, 1 claim, patented, area 20' acres. Mine is in the southwestern portion of the Butte district, a few hundred feet east of the Travona. Property has several veins including the North and South, and a cross fissure, known as the Blue vein.

Mine is developed by 3-compartment shaft, 1,000' deep, with workings on the 100', 200', 300' and 500' levels, the mine having about $3\frac{1}{2}$ miles of workings. On the 300' level, 2 parallel veins have been opened up for a combined distance of 1,100' and on the 500' level for 700' the veins are typical silver veins of the camp carrying a mixture of zinc, lead and iron sulphides with occasional chalcopyrite in a hard, compact gangue of quartz and manganese (rhodochrosite and rhodonite). Estimates made by W. L. Creden in 1911, gave 32,000 tons of \$7 ore with values mostly in silver. Later estimates by Samuel Klaus, of 2,500,000 tons of \$11 ore, prove grossly in error. Reports by management of 30 to 50' of ore in various parts of the mine were not based on average samples. Last estimate furnished May, 1913, stated that veins were 6 to 10' wide, opened for 1,250' and 500' depth, averaging 0.01% copper, 0.1% lead, 15 ozs. silver and 50 cts. gold per ton.

It is now admitted that, though the veins are wide and carry numerous lenses of high-grade silver-gold ore, these shoots are short and narrow and cannot be mined at a profit because too much low-grade, or barren quartz, is broken down with the pay ore, the resultant mill feed being too low-grade to yield a profit.

Equipment is excellent, including a 330-h. p. steam plant and a hoist good for 2,000' in depth and a 7-drill Rand air compressor. There are 7 buildings, including an engine house, 18x24', carpenter shop, 18x36', smithy and an office.

Mr. Rothwell designed and built a 125-ton mill to treat the quartz ores by concentration with subsequent cyanidation of the quartz, when freed from sulphides. Experimental tests showed a recovery of 63.9% of gold and 39.44% of silver values by concentration and an added recovery of 35% of the gold and 43.35% of silver by cyanidation, a total of 84.7% of value of the ore. Ore is broken in a Sully gyratory crusher, is reduced to 24 mesh in Chilean mill, passes to 5 Deister concentrating tables whose tailings go to Atkins classifiers. The resultant sands go to 5x22' tube mill, grinding to 150 mesh. This product passes to sloughing-off cones, the underflow to 8 Deister slime tables. Tails are dewatered, agitated with cyanide in Atkins Rothwell continuous agitation tanks for 30 hours and run into Portland continuous slime filters. The filtered solution is treated in zinc boxes. This company's operations show the folly of spending money without technical advice. Mine development and mill construction were both carried on by competent men, but the essential thing—proper sampling and measurement of ore—was omitted. The result has been disastrous to everyone concerned except stock speculators. Press notices appearing frequently were misleading as to values and tonnage of ore and grave misrepresentations, implying examination and endorsement by various well-known engineers, were printed in the papers. Harper and McDonald, of Butte, and Walter Harvey Weed were both wrongfully mentioned in this way, the former being made sponsor for an estimate of 479,225 tons ore reserves, when neither sampling nor ore measurements had been made. The eastern management has therefore been looked upon with suspicion, especially as

the mine and mill reports were also used in a press and market campaign to boost the stock from less than a dollar to over \$9 a share.

It is now admitted that the veins, though of unusually generous width, are not workable as a whole; that the values are spotty and the reserves cannot be profitably mined and concentrated under present conditions. The plant is a good one and the scheme of treatment sound—only the treatment costs are higher than the grade of ore will permit.

For some years Mr. Sam McConnell, the superintendent, has shown his faith in the property, keeping it unwatered for months at his own expense. No man has done so much with so little money. He has been optimistic but he took stock for his salary and was, and is, honest in his belief in the mine.

The property itself is still a prospect. It is well equipped and its mill should, by treating custom ore, revive silver mining in the district; but it is now known that the Ophir is not a success as a silver mine despite the extravagant claims of width and values of ore given the press. Its future lies in deep development and the proving of the veins below the 1,000' level. It is well located and worthy of legitimate prospecting.

In July it was reported that the company was being reorganized by Thos. F. Cole and that the property would be turned over to the North Butte Co.

Company petitioned into bankruptcy Aug. 28, 1913, and property shut down.

BUTTE CENTRAL COPPER MINING CO. MONTANA

Reorganized, 1908, as Butte Central Copper Co. Described Vol. VIII.

BUTTE CENTRAL COPPER MINING & SMELTING CO. MONTANA

Succeeded by the Butte Central Copper Mining Co. See Vol. X.

BUTTE-CHEWELAH COPPER CO. WASHINGTON

Pres.: J. O. Gillice, Paulson Bldg., Spokane, Wash.; F. M. Bell, vice-pres.; P. L. Eberhardt, sec.-treas.; preceding officers, G. B. Harrington and R. J. Davis, directors. R. J. Davis, gen. mgr. Organized March, 1913, under laws of Washington, capitalization \$1,000,000, shares \$1 par, fully paid and nonassessable; 500,000 issued.

Property, 4 claims, 75 acres, in the Valley mining district, Washington. Shows vein in sedimentaries close to a diabase intrusion; average strike N. 25° E., and dip 60°. Ore occurs as mixed sulphides, mainly chalcopyrite and gray copper in a gangue of quartz, calcite and spathic iron. At 100' in depth the vein is said to be 20' wide and the ore to average 2 to 5% copper, 1 to 5 oz. in silver and 50 cents to \$1 in gold per ton.

The property is simply a prospect upon which considerable development work will be done this year to determine whether the ore values increase with depth. A winze will be sunk about 300' on the ore showing, giving a total of 400', and if property then warrants it, a large shaft will be put down. Equipment includes a hoist and air compressor, installed in Sept., 1913.

BUTTE COALITION MINING CO. MONTANA

Dissolved, 1911, and assets distributed pro rata among stockholders at rate of \$4.46 cash and 52-100 of a share of Anaconda Copper Mining Co's. stock for each share of Butte Coalition. Described Vol. X.

BUTTE CONSOLIDATED COPPER CO. MONTANA

Idle. Letters to Butte, Silver Bow Co., Mont., unclaimed. Organized Jan. 12, 1906, under laws of Montana, capitalization \$6,000,000, shares \$1 par. Statement of Jan. 1, 1909, gave \$15,764 liabilities. Lands, 34 claims, area 500 acres, including 10 patented claims, known as the Susie group, ad-

joining the Butte & Bacorn on the north, opened by a 225' tunnel, and a 150' two-compartment shaft, latter very wet.

BUTTE CONSOLIDATED COPPER MINING CO. MONTANA

Mine P. O.: Corbin, Jefferson Co., Mont. D. D. Tuohy, pres.; Martin Mulvahill, vice-pres.; preceding officers, C. D. McCarthy, T. J. Walsh and C. R. Gruwall, directors. Organized June 30, 1906, under laws of Montana, capitalization \$600,000, shares \$1 par. Lands, northeast of the Corbin-Wickes, have a 300' shaft, with a crosscut, seeking the Bertha vein, which has developed a little sulphide ore giving assays of 30 oz. silver. Has steam power. Idle and apparently waiting for developments in the Bertha mine of the Boston-Corbin Co. to prove this property.

BUTTE COPPER CO. MONTANA

Address: care James H. Rowe, pres., 120 West Granite St., Butte, Mont. E. T. Lawlor, vice-pres., Brookline, Mass.; W. M. Hanson, sec.; preceding officers, R. L. Rhule and B. J. Keenan, M. D., directors. Organized March 20, 1906, under laws of Montana, capitalization \$1,500,000, shares \$1.50 par, fully paid and nonassessable. Company owns two-third interest in the Robert Emmet claim Nos. 1 and 2; the remaining third being owned by the Anaconda Mining Co. Company also owns approximately one-half of the Anselmo, Anselmo No. 2 and Trifle claims, balance being owned by the Hauswirth family. Property lies directly west of the Gagnon mine and is supposed to carry the extension of the rich veins mined in that property. The group has produced about \$700,000 worth of gold and silver ore, the principal development being the 700' Trifle shaft in which a large vein carrying copper ore was cut at a depth of 375'. The Robert Emmet shaft, 375' deep, is said to be bottomed in 7% copper ore.

The company has been dormant for several years and its relations to the Butte Copper Mining Co. and Butte Copper Montana are not fully understood, though the latter company is supposed to control this one through stock ownership. The management proper is responsible and is said to be beyond reproach from a business and financial point of view.

BUTTE COPPER KING MINING CO. MONTANA

Address: care Beebe Grain Co., Butte, Mont. C. E. Beebe, pres.; D. Dorais, vice-pres.; A. P. Henningsen, sec.; R. H. Campbell, treas., and Henry Avare, directors, all of Butte. Organized April 19, 1906, under laws of Montana, capitalization \$1,500,000, shares \$1.50 par. Lands, 3 fractional claims, are 28 acres, known as the Frenchman No. 2, Rare Steak and Missouri Girl, west of the Jennie Dell mine. Company planned sinking a 1,000' shaft, on the Missouri Girl, but no work was done. Idle since organization.

BUTTE COPPER MONTANA. MONTANA

At Butte, Silver Bow Co., Mont. C. E. Burrelle, pres.; E. H. Sherman, vice-pres.; John MacGinnis, gen. mgr.; W. L. Lawler, treas.; preceding officers and W. L. Moyer, directors; Robt. Hauswirth, supt. Organized Dec. 1, 1906, under laws of Maine, capitalization \$1,750,000, shares \$1 par. Trust Company of America, New York, transfer agent. Is apparently a holding company only. See Butte Copper Co.

BUTTE & CORBIN CONS. COPPER MINING CO. MONTANA

J. L. Templeman, pres.; Lee Williams, vice-pres.; J. B. Fitzpatrick, sec.-treas., at last accounts. H. Burnson, cons. engr., Salt Lake City, Utah.; H. E. Emerson, supt., Corbin, Mont. Organized May 1, 1907, under laws of Montana, capitalization \$700,000, shares \$1 par, nonassessable; issued \$469,000. Annual meeting Feb., 4.

Property, 5 claims, 82 acres, also 10 acres timber lands in the Corbin, or Colorado district, on the eastern side of Valparaiso mountain. The ore

is a complex mixture of lead, copper and zinc, occurring in short shoots in fissure veins in granite. Vein reported by company to average 8' 4" in width, and to carry 4% copper, 6% lead, 2% zinc, 8 oz. silver and \$1 gold per ton.

Developed by the 500' Rarus tunnel which cut a 10' vein at 165' from the portal, assaying 2.5% copper, with paystreak carrying covellite, averaging 6% copper, 8 oz. silver and \$6 gold per ton. A new shaft was started Oct., 1909, at the mouth of the Rarus tunnel. A body of rich ore was reported found in June, 1912, and the Great Northern railroad asked to put a siding on this property. Amount of ore on dump, 7,000 tons of \$10 value, according to Ropes & McIntyre of Helena, Mont., who reported on property. Property now idle.

BUTTE-CURTIS & MAJORS COPPER MINING CO. MONTANA

W. D. Clark, vice-pres. and mgr., Butte, Mont.; Geo. D. Curtis, sec.-treas. Organized 1907, under laws of Montana, capitalization \$1,000,000, shares \$2 par, nonassessable; issued about 200,000 shares.

Company organized upon a lease and bond to purchase the surface and mineral rights of the Curtis and Majors addition to the City of Butte, the bond price being \$125,000, payable in 18 months with 25% royalty on shipments for first 6 months. Property is in South Butte adjoining the Northern Pacific Co. tract and contains about 5 acres.

Development is by 300' shaft with levels at 150' and 300', the latter showing a 4' vein with considerable zinc, from which \$10,000 worth of ore was shipped. The company went bankrupt and still owes about \$700 labor claims. There are no legal assets and having defaulted on bond payment past due, the company has no rights thereunder, save the sentimental courtesy extended by John Curtis and associates who would like to see the company rehabilitated and refinanced.

BUTTE-DULUTH MINING CO. MONTANA

Office and mine: Butte, Mont. Capt. A. B. Wolvin, pres.; C. M. Everson, Alfred C. Kremer, L. P. Sanders, J. Bruce Kremer and W. M. Tuohy, directors. W. L. Creden, cons. engr.; C. Lorimer Colburn, mgr.; A. W. Hudson, metallurgist

Lands comprise 2 groups, the Brundy group at the base of the mountains east of Butte and the Wolvin, or Stonewall-Bryan group, north of the Butte-Superior mine. At present all work is confined to the Brundy group comprising the Macarona, Montgomery and portions of the Altona, Colleen Bawn and Amazon claims. These claims aggregate 67 acres and are crossed by the Columbia Gardens street car line and adjoin the Pittsmt mine on the southeast.

Development underground is mainly on the Montgomery claim on which there is a tunnel 1,200' long and a 200' shaft, the latter with extensive workings at 100'. The main ore supply for the leaching plant comes from open quarry work on Altona hill to the east of the street car line, but there are also several tunnels proving the downward extension of the ore on the property. Equipment is electrical throughout and includes a 75-h. p. Nordberg hoist and 750-cu. ft. Nordberg compressor at the Montgomery shaft.

A 100-ton leaching plant, designed by J. D. Fields, was erected and in operation in 1913. The ore crushed to one half inch is leached in square tanks with 4% sulphuric acid solution, passing successively through several tanks, the final copper-bearing solution going to electrolytic tanks where the copper is precipitated on thin sheets of copper by electric current. The resulting product is electrolytic copper ready for sale. The cost of producing copper with the present plant is estimated at 13.7 cts. per lb., being

4.725 cts. for acid, 1 ct. for power and 8 cts. for mining and reduction costs. The wash water from the leaching tank will be treated with scrap iron, recovering cement copper at an estimated cost of $4\frac{1}{2}$ cts. per lb. With the new plant to be erected in 1914 the cost should not be over 8 or 9 cts. per lb. The ore is peculiarly amenable to leaching and the process can be made a commercial success, but needs skilled technical handling and must be worked on a large scale to be made profitable.

The property has merit and aside from its leaching ores has a decided prospective value in the veins at depths of 1,000' or more below the surface.

The Wolvin group under option to the company, has several very large, persistent veins extensively opened by pits and open trenches, but without deep development work. The group is regarded as a valuable one, well worthy of drilling.

BUTTE & ELLISTON GOLD & COPPER MINING CO. MONTANA

Office: 113 Hamilton Block, Butte, Mont. Mine near Elliston, Powell Co., Mont. Dr. P. A. Breen, pres.; Chas. M. Joyce, vice-pres.; F. H. Cooney, sec.-treas.; preceding officers, Chas. A. Blackburn, D. E. Bertoglio and J. H. McOmney, directors. F. H. Cooney, mgr.; A. F. Monroe, engr. Organized 1907, under laws of Arizona, capitalization \$1,000,000, shares \$1 par, fully paid and nonassessable; issued, 275,000. Dividend of 1% paid 1907.

Property, 1 claim, patented, 17 acres, in the Ontario, or Elliston mining district, known as the Big Dick mine, 6 miles from Elliston on the side of Nigger mountain. Claim shows diorite having 6' fissure vein developed by 280' shaft and 1,000' of workings. Ore carries lead, silver and some copper averaging about \$30 per ton. A new 1,135' tunnel now being driven, will intersect vein 200' below bottom of the shaft. This tunnel was 600' long in July, 1913.

Equipped with 25-h. p. hoist and surface buildings. Production from 1901 to 1908 was \$73,906 net smelter returns.

Property now under lease and bond to Frank Cooney and P. J. Bennetts, both of Butte, Mont.

BUTTE & ELY COPPER CO.

NEVADA

General office: 1400 Alworth Bldg., Duluth, Minn. Principal office: Room 302, O'Rourke Estate Bldg., Butte, Mont. Mine P. O.: Kimberly, White Pine Co., Nev. Jos. Cotton, pres.; B. E. Calkins, vice-pres.; John W. Neukom, sec.; Edw. J. Maney, treas.; preceding officers and J. A. Heilbronner, directors. Organized July 27, 1905, under laws of Montana, capitalization \$500,000, shares \$1 par; stock was made assessable, 1907. Is a subsidiary of the Consolidated Copper Mines Co. Jan. 1, 1913, had \$240,034 in cash and cash assets in treasury. Stock is listed on the Butte Mining Exchange. Annual meeting, third Wednesday in January.

Lands, 12 claims, patented, area 210 acres, in the Robinson district, lying between the Nevada Consolidated and Giroux. Property includes a valuable water right, 20 miles distant, said to be capable of supplying 2,000,000 gal. daily; also 80 acres irrigable land near water rights.

Developed by 3 shafts, 1 with steam hoist, 310' deep, showing disseminated ore. Mining was suspended late in 1907, but churn drilling was carried on in succeeding years intermittently, developing several bodies of low-grade disseminated ore. In 1912, a part of the ground adjacent to the Liberty pit of the Nevada Consolidated Co., was leased to that company on a royalty basis and has been mined. During the same year, churn-drilling exploration was carried on, 100 holes blocking out orebodies which show an average of $1\frac{1}{2}\%$ copper.

The sale of control of this mine to the Giroux Co., hailed at first as a boon, has been bitterly denounced by many Butte-Ely stockholders. Stock

prices went down, development lagged and the sale was said to have been used as a means of securing the cash in the Butte-Ely treasury, it being charged that the Giroux Co. borrowed the money back immediately after paying it.

In 1913, the Consolidated Copper Mines Co. was formed to merge the Butte & Ely with the Giroux and other companies, the Butte & Ely receiving 5% of the capital stock of the new company for its entire holdings, equivalent to $6\frac{1}{4}$ shares of Butte & Ely for 1 of the Consolidated. Objecting to this merger, certain Butte stockholders began injunction and receivership proceedings, which were decided adversely by the Court.

The merger is regarded as a good thing for the Butte & Ely since it gives the stockholders a valuable and marketable security whereas their own company is too small to ever become a profitable enterprise. The new company has technical skill of the highest ability and is backed by men of genius and financial strength.

BUTTE GOLD, SILVER & COPPER CO.

WASHINGTON

Letter returned unclaimed from former mine office, Stehekin, Chelan Co., Wash. Lands are on Bridge creek, about 25 miles from the head of Lake Chelan, Washington, showing 2 veins, one 8' wide, opened by tunnels. Long idle and apparently moribund.

BUTTE & GREAT FALLS MINING CO.

MONTANA

Is developing the Genevieve group of claims near head of Dixie gulch, $3\frac{1}{2}$ miles northeast of the Butte & Superior property. Claims show wide, rusty veins carrying tourmaline and occasional specks of chalcopryite. Has a 200' shaft and will develop ground at that depth by crosscutting. Equipment includes steam hoist and 2-drill compressor. Property not regarded favorably, but management honest.

BUTTE HILL COPPER MINING CO.

MONTANA

Address: care Harry A. Frank, sec., Butte, Mont. Maurice Eisenberg, pres.; J. W. Murphy, vice-pres.; preceding officers, J. W. Murphy, Duncan MacRae, W. P. Cary, W. H. Hall, Thos. Driscoll and John S. Davies, directors. Organized April 18, 1906, under laws of Montana, capitalization \$5,000,000, shares \$5 par; \$2,950,000 issued. Annual meeting, fourth Saturday in January.

Lands, 11 claims, area 173 acres, in an undeveloped district in granite area, north of Walkerville. Has a 200' shaft, cutting a vein of 40' estimated width, showing stringers and bunches of ore assaying up to 4% copper and 19 oz. silver per ton. Has not been worked for several years and power plant is dismantled. Property is well located, has strong veins and is much nearer developed ground than it was when operating.

BUTTE-HOMESTAKE COPPER MINING CO.

MONTANA

Idle. Mine near Homestake, Jefferson Co., Mont. Daniel Agoa, supt., at last accounts. Lands, 5 claims, patented, 98 acres, well wooded and watered, 2 miles from the Northern Pacific railway, formerly held by Homestake Mining Co. Mine has a 185' two-compartment shaft, on the Last Chance claim, connecting with a 270' tunnel, showing a 5 to 7' vein carrying ore of medium grade, with quartz gangue, assaying up to 6% copper and 38 oz. silver per ton. Mine also has an 85' shaft, and a small vein on the Mammoth claim has given ore assaying 20% copper, 125 oz. silver and \$6 gold per ton. Property is said to have, on the dumps, 1,700 tons of low-grade ore, worth about \$6 per ton. Equipment includes two 80-h. p. boilers, and there are 5 buildings. Closed down several years and apparently moribund.

BUTTE & IDAHO GOLD & COPPER MINING CO.

IDAHO

Probably dead. Formerly at Salmon, Lemhi Co., Idaho. See Vol. X.

BUTTE LODE EXTENSION MINING CO.**MONTANA**

Idle. Address: care C. J. Kelly, treas., Butte, Silver Bow Co., Mont. Chas. S. Warren, vice-pres.; John M. Murphy, sec. Organized April 28, 1906, under laws of Montana, capitalization \$500,000, shares \$1 par. Lands, 4 claims, known as the St. Angus group, 12 miles northeast of Butte, having a 150' shaft with a crosscut showing 2 veins.

BUTTE & LONDON COPPER DEVELOPMENT CO.**MONTANA**

Office of mine: 46 East Broadway, Butte, Silver Bow Co., Mont. W. W. McDowell, pres.; John D. Haines, vice-pres.; W. E. Reynolds, sec.; J. W. Wallisch, treas.; preceding officers, Fred Whiteside, Guy W. Stapleton, John P. Reins, J. W. Pratt, H. B. Byrne, E. J. Anderson and T. H. Emery, directors. Organized Jan., 1906, under laws of Arizona, as Butte & London Copper Co., capitalization \$5,000,000, shares \$5 par, non-assessable; \$2,830,000 outstanding. Changed name to present title, April, 1906. Annual meeting, third Tuesday in January.

Lands, 113 acres, known as the Greendale placer claims, lying immediately north of the Pittsburgh & Montana in the valley of Silver Bow creek, east of Butte. Property claimed by the management to carry the possible extension of the Rainbow lode. Forty acres of the property is said to be valuable for town-site purposes.

The mine has an 1,130' three-compartment shaft, 2 crosscuts on the 1,100' level cutting 9 veins, none carrying ore of commercial value, except a streak that gave assays of 2% copper, 50 oz. silver and \$2 gold per ton.

The company agreed Dec. 24, 1912, to accept a contract with Thos. F. Cole, for the transfer of all its property to a new company with a capitalization of \$200,000, to be organized by him. The terms of the contract provide that in consideration of sinking the 1,130' shaft an additional 500', running crosscuts north and south 2,500' the entire width of the property, and doing other stipulated development work, Mr. Cole is to receive 51% of the stock of the new company, one-half to be paid as the work progresses, the balance remaining in escrow until the work is finished. Mr. Cole announced his intention of spending \$300,000 on this development.

BUTTE MAIN RANGE COPPER MINING CO.**MONTANA**

Office: care of State Savings Bank, Butte, Mont. Edward Hickey, pres.; P. J. Brophy, vice-pres.; Frank X. Giard, vice-pres.; Ray J. MacDonald, treas.; Edward Hickey, Jr., sec.; preceding officers, Charles R. Leonard, M. Sellers Largey, Pat. Sheehan, J. J. Harrington and T. E. Murray, directors. Company organized about Aug., 1912, under laws of Montana, capitalization \$1,500,000, shares \$1 par.

Property comprises 45 acres, claims include Sinbad Lode, Spread Delight, Rory O'More and larger fractional part of the Lillie claim, at the mouth of Horse canyon, Butte, Mont.

Contains several fissure veins and probably the extension of the Bertha fault zone, carrying green-stained granite and chrysocolla similar to the Bullwhacker. Deep developments in the Pittsmonst mine of the East Butte Co. show that at 1,200' high-grade ore may be expected in the veins of this vicinity. The Lillie claim shows a large limonite capping and the new open cut and tunnel work show a body of leaching ore. On the Sinbad, the Largey shaft, 716' deep, developed 2 veins at 410' and 490' but no bodies of commercial ore were found. Extensive development is planned for 1913 and equipment, with a power plant and hoist, is expected to be installed during the summer.

Property is meritorious, officers capable and trustworthy. In July, 1913, the Tuolumne Co. proposed taking over this property, but the project was abandoned.

BUTTE-MILWAUKEE COPPER CO.**MONTANA**

Office: 25 Broad St., New York. Mine office: O'Rourke Estate Bldg., Butte, Silver Bow Co., Mont. C. W. Peters, pres.; H. G. Bell, vice-pres.; Keith Stewart, sec.-treas.; preceding officers, R. C. Porter and E. W. O'Meara, directors. Organized March 28, 1906, capitalization \$3,000,000, shares \$2 par. Is a subsidiary of the Butte & Superior Copper Co., through control of Butte & New York Copper Co., which owns 92% of the Butte-Milwaukee stock. Has a \$10,000 mortgage, at 8%, dated March, 1909. Statement of Jan. 1, 1910, gave liabilities of \$11,500.

Lands formerly included 6 claims near the Butte & Argenta, at Argenta, Mont., on which apparently no work was done, and which presumably have been abandoned.

Owns 4 claims, patented, known as the Pollock, Colonel Sellers, Florence and Bird, lying immediately north of the Butte & Superior.

Surface outcrop on Bird claim is 100' wide and resembles outcroppings of the typical fault veins of the district.

The Pollock mine has 4 veins, 2 more or less developed by a short tunnel and a 730' three-compartment shaft. A silver vein has been opened on the 300' level, and the mine is said to have produced, years ago, about \$400,000 worth of ore, with values mainly in silver and gold, from above the 200' level, and a little ore running 2% copper and 15 oz. silver per ton, with small gold values, was produced, 1906, by present company.

The Colonel Sellers claim has a promising surface showing with strong persistent quartz veins in granite. The Butte & Superior completed the sinking of the 1,200' Milwaukee shaft on Colonel Sellers claim and connected it by crosscutting with 1,200' level of Black Rock mine. This work is being continued beyond the Colonel Sellers shaft so as to open the Mastodon vein on the Florence claim. The Milwaukee shaft is well equipped with power plant and hoist and future exploration can be done from this point without regard to the Butte & Superior Co. Property valuable and likely to be worked when the Butte & Superior is able to handle the ore.

BUTTE MINE EXPLORATION CO.**MONTANA**

Clinton C. Clark, pres., 408 West Granite St., Butte, Mont.; C. P. Conolly, sec., at last accounts. Organized 1901, capitalization \$250,000, shares \$1 par. Is no relation to the company of same title formerly holding the Six O'Clock property, in Butte, or to the Butte Mines Exploration Co. formerly having property at Tecoma, Box Elder Co., Utah. Property is the Pacific quartz lode claim, on which considerable work was done, 1901-02; since idle.

BUTTE-MINNESOTA MINING CO.**MONTANA**

Peter E. Peterson, pres.; Angus McLeod, William Vuoti, J. E. Porthan, A. W. Havela, John Kukko, Emmanuel Autio, John Lampi, Ade Herranen, directors, all of Chisholm, Minn. Mines near Butte and Helena. Company organized June, 1912, capitalization \$750,000, shares \$1 par.

Owns 6 claims, about 1 mile south of Rocker, at the western end of the Butte district. Ground shows well-defined veins, 1 of which is traceable for 3,000' across the surface. The country rock is granite and part of the same mass as that in which the mines of Butte occur.

Development is by a tunnel 400' long on the vein and by an incline shaft 35' deep sunk on the vein disclosing well-defined walls, 6' apart, from which ore has been taken carrying 0.5% copper, 8% lead, 12 oz. silver and \$28 gold per ton.

The property is equipped with a gallows frame, boilers and hoist.

Late in June, 1913, the company bought a group of mining claims in the Wolf Creek district, 40 miles east of Helena, Mont. Reports state that

development on these claims show more than 100,000 tons of ore assaying 4 to 25% copper blocked out. A mill is to be built.

BUTTE MONITOR TUNNEL MINING CO.**MONTANA**

Office: care C. W. Pomeroy, vice-pres., 145 La Salle St., Chicago, Ill. Capitalization \$3,750,000, shares \$1 par.

Lands, 7 claims, area 102 acres, near the eastern portal of the Woodville tunnel, on the Great Northern railway, in the eastern part of the Butte district. Development is by shafts of 40' and 80', and 1,412' Schweitzer tunnel, latter cutting a number of veins, some of considerable width, 1 being claimed to be 80' wide. There also is a 300' crosscut tunnel on the Burner claim, cutting a strong vein supposed by management to be a continuation of the Homestake vein of the Anaconda. The Sunlight claim has 3 veins, of 10 to 20' width. Main tunnel is said to show chalcopyrite averaging about 2% copper and 2 oz. silver per ton, with small gold values.

The mine was shut down, 1899, by litigation. Considered worthy of further development and under option.

BUTTE & NEW YORK COPPER CO.**MONTANA**

Office: 25 Broad St., New York. M. M. Ferguson, pres.; R. J. Schaefer, vice-pres.; C. E. Connell, sec.-treas.; preceding officers, A. B. Wolvin, Leo Schlesinger, N. B. MacKelvie, Philip Lawrence, A. P. Ronaghan, J. B. Kremer, G. M. Minzesheimer and T. F. Nelson, directors. A. J. Ronaghan, asst. sec. Organized Oct. 17, 1906, under laws of South Dakota, capitalization \$4,000,000, shares \$5 par; issued, \$2,768,705. Empire Trust Co., New York, registrar; B. Liddle, transfer agent. Annual meeting, second Monday in January. Is a holding company only, controlling the Butte-Milwaukee Copper Co., through ownership of about 92%, or 1,384,355 shares of its 1,500,000 stock issue. Present management has no connection with the promoters. Property is a subsidiary of the Butte & Superior Copper Co., Ltd.

BUTTE NORTHERN MINING CO.**MONTANA**

Office: Butte, Mont. C. J. Edwards, mgr., at last accounts. Property in the mountain range northeast of Butte, Silver Bow Co., Mont. Group of claims covering summit of the range is now being developed by a tunnel pushed from both sides, a contract being let for 300' in Feb., 1912. The other end of the tunnel, now in about 400', is being driven by the Butte City Mining Co. G. W. Lansing of Spokane is one of the principal owners.

BUTTE & PHILADELPHIA MINE.**MONTANA**

Idle. Is situated at 7,800' elevation on Three Brothers peaks, 8 miles north by wagon road of Basin, Mont. Machinery was installed and development work in progress during 1911. Three parallel veins traverse the granite, 1 developed by 250' tunnel. The strike is N. 80° W. and the dip 65° N. The ore occupies a 7 to 10' crushed zone in the granite. Pyrite, with small amounts of galena and sphalerite, occurs with very little quartz. Between the pyrite and the heavy zone of gouge that occurs along the hanging wall, there are in places slabs of galena 1" thick and from 1 to 2' in diameter, showing a banded structure.

BUTTE & RED EAGLE COPPER CO.**MONTANA**

Address: care John D. Haines, sec., P. O. Box 1401, Butte, Mont. Fayette Harrington, pres. Organized May, 1907, under laws of Montana, capitalization \$5,000,000, shares \$5 par. Lands, 7 claims, southeast of the Butte & Bacorn, the Red Eagle claim having a 400' tunnel, showing a little ore. Shut down since 1907, but company still alive.

BUTTE & ROCHER DE BOULE COPPER CO. BRITISH COLUMBIA

Office: 49 East Broadway, Butte, Mont. Branch office: Hazelton, B. C. Samuel McConnell, pres.; C. J. Stone, vice-pres.; J. W. MacLane, sec.-

treas.; preceding officers, Paul Ozanne and P. J. Jennings, directors. Organized 1912, under laws of Arizona, capitalization \$1,000,000, shares \$1 par; fully issued and nonassessable.

Property consists of the Highland Boy group adjoining, but 1,000' above the Rocher de Boule mine and covering 400 acres on Juniper basin, Rocher de Boule mountain, Omineca mining district, 3 miles from New Hazelton and 4 miles from the Grand Trunk railroad. Claims show the extension of the Rocher de Boule veins, 2 of which can be opened by tunnels with development of shipping ore. Ore occurs in contact veins following intrusive dikes of porphyry in granite. Samples from 3 veins 3 to 9' wide, assayed from \$10 to \$20 copper, with \$10 to \$20 silver and gold values.

Developed by 2 tunnels, the uppermost called No. 1, showing 4' of chalcopyrite ore and No. 2 tunnel, 150' lower, 40' long in Aug., 1913, which follows the vein.

BUTTE & SUPERIOR COPPER CO., LTD.

MONTANA

Office: 25 Broad St., New York. Mine office: Butte, Mont. N. Bruce MacKelvie, pres.; K. R. Babbitt, vice-pres.; A. J. Ronaghan, sec.; C. W. Peters, treas.; preceding officers, A. B. Wolvin, and D. C. Jackling, directors; W. L. Creden, cons. engr.; J. L. Bruce, mgr.; Angus McLeod, supt.; F. R. Wickes, mill supt. Organized Oct., 1906, under laws of Arizona, capitalization originally \$6,000,000, shares \$5 par; reduced, Dec. 3, 1910, to \$2,500,000, shares \$10 par, nonassessable; increased Sept., 1912, to \$3,500,000, outstanding, \$2,712,060. Bonds \$1,000,000 authorized, 10-year, 6% trust mortgage, due Sept. 20, 1920; total amount outstanding, 1913, \$10,750. These bonds are convertible at option of holder into stock at par at any time on or before Sept. 20, 1915. Shares listed on Boston and Paris stock exchanges. Controls the North Butte Extension Development Co., through ownership of 80% of the stock. Also controls the Butte-New York Copper Co., through ownership of more than 55%, the latter company controlling the Butte-Milwaukee Copper Co., through ownership of about 92% of outstanding stock. Old Colony Trust Co., Boston, transfer agent; National Shawmut Bank, Boston, registrar. Annual meeting, second Tuesday in February at Duluth, Minn.

The 1912 operations show an operating profit of \$146,507 despite the intermittent operations and extraordinary expenses of the year. Current assets total \$844,520, including cash, \$519,558; ore in transit, \$187,083, and supplies, \$136,680; current liabilities, \$281,231; surplus, \$1,488,664.

Property, 9 claims, 87.62 acres, including the Black Rock, Niagara, Jersey Blue, Dewey, Four Johns, Constitution, Laura and Enterprise, about 3 miles north of Butte. The North Butte Extension Development Co. owns 6 adjoining claims, 41.28 acres, to the east; the Butte-Milwaukee owns 3 adjoining claims to the north and 2 others nearby, covering 50.73 acres. Company also has under option and partially paid for various interests in 27 adjoining claims, covering 240 acres. Principal property is the Black Rock mine, having a 1,630' vertical 4-compartment shaft. The property started as a copper mine, but has become a zinc mine, having in sight a large amount of zinc ore that is practically free from iron, rendering it readily amenable to concentration. The Black Rock carries an exceptionally strong vein, of 50 to 100' width, showing, on the 300' level, mainly silver values, but with ore up to 3% in copper tenor, succeeded at greater depth by zinc ore, slightly argentiferous and cupriferous. It was hoped, formerly, by the management, that the zinc would be replaced, at considerable depth, by a large body of copper ore of commercial grade, but there is no evidence as yet of this change. The Black Rock claim covers an area of 14 acres and has been developed from the 800' level to the 1,600', particularly the

1,200', 1,300' and 1,400' levels, the others being but partially explored. Management reports ore blocked out and ready for mining, 1,200,000 tons, the major portion between the 1,000' and 1,400' levels. The ore is sphalerite with a quartz gangue, the zinc sulphide being mostly dark-brown blende mixed with some gray blende; it is friable, breaking into crystalline fragments, separating easily and amenable to concentration. The ore actually blocked out is said to have an average value of 21.7% zinc, with 7.9 oz. silver per ton. Copper has been found in small quantities mixed with the zinc, but does not appear in the output. The plant at the Black Rock mine includes a full equipment of steam plant, air compressors, complete electric plant and hoist good for 3,500'. Compressor plant and mill are operated with electric power. Buildings include a boiler house, engine house, compressor building and pumping stations. The mine is connected by spurs with 2 railroads.

The Niagara mine, last worked by lessees, 1907, produced a little high-grade silver ore. The Milwaukee mine is described under the title Butte-Milwaukee Copper Co.

A concentrating mill of 1,000 tons daily capacity was constructed in 1912, but was not in continuous operation until the close of the year. The ore is first concentrated in jigs which recover about 40% and the discard reground and treated by the oil flotation process. The mill was remodeled under the supervision of D. C. Jackling and has fully demonstrated the success of the flotation process for the treatment of these ores; 18,400 tons of ore were treated, Jan., 1913, with a recovery of 80% and making 49% concentrate. This result is mainly due to the flotation plant of the mill. The mill is in full operation, handles 1,000 to 1,500 tons daily of 20% ore, producing monthly concentrates containing about 10,000,000 lbs. of zinc.

There was mined in 1912, 137,517 gross tons of ore from which was obtained 35,529 tons of concentrates containing about 31,000,000 lbs. of zinc. The concentrates carry about 50% zinc and are sold to the American Metal Co. and treated in the Oklahoma zinc plants. The residue containing the silver is shipped to Colorado smelters for the recovery of silver values, since the ore averages 7 oz. per ton in silver and in some parts of the mine carries as high as 140 oz. per ton.

Costs for 1911 are officially reported as: Mining, \$2.50; development, 50 cts.; milling, \$1; transportation, etc., \$2.83; total, \$7.33. The new plant, when handling from 1,000 to 1,500 tons daily, should have a material reduction.

Production for May, 7,707,000 lbs. zinc; for June, 6,714,000 lbs.; for July, 8,892,343 lbs.; for August, 11,167,000 lbs., and for 9 days in September, 3,594,174 lbs.

The court decided against the company in the suit over the use of the flotation process of concentration. There is also an amicable apex controversy with the Elm Orlu Mining Co. which involves considerable legal development work likely to greatly increase the ore reserves of both properties. As Senator Clark is the largest individual stockholder in the Butte & Superior Co., as well as half owner of the Elm Orlu, a friendly settlement is probable. Mr. J. W. Finch has examined the ground in controversy for the Butte & Superior and Walter Harvey Weed for the Elm Orlu Mining Co.

In 1912, the controlling interests of the company passed into the hands of Hayden, Stone & Co. representing the so-called Guggenheim interests, who have been closely identified with the Utah Copper Co., Chino, Ray and other of our greatest and most successful mining companies, thus ensuring ample finances and competent direction.

BUTTE & VERDE GOLD & COPPER CO.**ARIZONA**

Idle. Office and mine: Jerome, Yavapai Co., Ariz. Organized April, 1909, capitalization \$1,500,000, shares \$1 par. Lands, 10 claims, near Allen Springs, having a 200' tunnel, said to show a 4' vein of sulphide copper ore.

BUTTE & VERONICA COPPER MINING CO.**MONTANA**

Formerly at Butte, Mont. See Vol. X. Organized by Michael McNulty and Mike O'Farrell to operate a location on Great Northern placer ground in South Butte. Sank shaft and mined some ore but were stopped by injunction granted to the South Butte Mining Co., a Lewisohn company, which held a 20-year lease from Great Northern railway, on the mineral rights of all its holdings in South Butte.

BUTTE & YERINGTON COPPER CO.**NEVADA**

Office: care W. E. Wright, sec.-treas., 410 Phoenix Bldg., Butte, Mont. Mine at Yerington, Lyon Co., Nev. W. C. Siderfin, pres.; B. E. Calkins, vice-pres.; preceding officers, Dr. Thos. B. Moore, Dr. Donald Campbell, John D. Pope and Wm. Mitchell, directors; L. W. Trankle, supt. Organized Jan. 29, 1907, under laws of Montana, capitalization \$1,000,000, shares \$1 par, fully paid; issued, 351,520. Annual meeting, second Wednesday in January.

Property consists of 2 groups of claims, one of 14 patented claims, about 4 miles east of and across the valley from Yerington and south of the Copper Mountain mine. The land has very attractive surface showings, but is without deep development work.

The second group of 9 claims, patented, is in the heart of the camp adjoining the big Mason Valley mine and the Yerington Malachite Co.'s ground. This property is well located and has attractive showings of ore in the tunnels and on the surface outcrops. It has been idle during the past year awaiting patents from the Land Office.

BUTTE & ZENITH CITY MINING CO.**MONTANA**

Office: care I. Freimuth, Duluth, Minn. Mine address: P. O. Box 6, Butte, Mont. I. Freimuth, pres.; William White, vice-pres.; Sol. Gensburger, sec.; John Killorin, treas.; preceding officers, and J. A. Percival, directors. Organized about Oct., 1912, under laws of Arizona, capitalization 300,000 shares, \$10 par.

Property consists of 240 acres of patented ground and several unpatented claims, all in a compact group about 2 miles west of the developed section of the Butte district and a short distance south of Silver Bow junction, where 4 railroads meet. Ground shows Butte granite and aplite cut by numerous strong and persistent quartz veins and also the later fault veins which in the copper district of the Butte camp have proven so productive. Development by former owners has been shallow with several 50 to 100' shafts. This company has sunk a new shaft, now over 500' deep with a crosscut at 460', which was closed down in August, owing to a heavy flow of water from the vein. The veins show occasional values at the surface, but not in commercial quantities. The quartz veins are of the silver type, but the cross veins are similar to the copper veins of Butte.

BY-CHANCE COPPER CO.**NEW MEXICO**

Office: Brice, via Oro Grande, Otero Co., N. M. Properties optioned July, 1912, under lease and bond to Jarilla Copper Syndicate and company is inactive at present.

BYRNE MINING & SMELTING CO.**WASHINGTON**

Idle. Mine office: Keller, Ferry Co., Wash. Mine, apparently devel-

oped but slightly, carries argentiferous copper ores, and is equipped with steam power.

CABABI MINING CO.**ARIZONA**

Secretary and address: Wm. H. Kershner, 514 Hume-Mansur Bldg., Indianapolis; Ind. Mine P. O.: Camp Cababi, via Tucson, Pima Co., Ariz. Chas. N. Wilson, pres.; Allen W. Conduitt, vice-pres.; preceding officers, H. A. Walker, E. B. Peck, E. J. Scoonover, Albert Off, Carl H. Graf and R. A. Wilcox, directors. S. G. McWade, gen. mgr., P. O. Box 464, Tucson. Ariz. C. J. Price, mg. engr.; Harry Orndorff, purch. agt.

Organized 1908, under laws of Arizona, capitalization \$1,500,000, shares \$1 par, nonassessable; issued \$1,250,000. Annual meeting, third Monday in June.

Lands, 44 claims, area about 900 acres, 4 claims patented, 35 in process of patenting, also 2 mill sites of 5 acres, situated in the Cababi mountains, 69 miles southwest of Tucson.

Property, developed by numerous shallow shafts, and main shaft 222' sunk on the Picacho claim, with total of about 1,180' of workings, includes an antigua, reopened about 1860 by Francisco Padrea, and which, years ago, was a small producer of auriferous and argentiferous copper and lead ores, with copper and silver predominating.

Equipment includes a steam hoist good for 500', an adobe store building and several frame structures and tents utilized as dwellings. Thirty miners employed.

A full report on the property made, Oct., 1912, by C. J. Price, mg. engr., shows 2,240 tons of ore, valued at \$28,485 on dumps. Manager reports 10,000 tons high-grade ore blocked out April 25, 1913.

CABALLO; MINA EL**MEXICO**

Idle. Mine office: Indé, Durango, Mex. Wm. Benton, owner. Has cupriferous silver ores and steam power.

CABIN BRANCH MINING CO.**VIRGINIA**

Office and mine: Dumfries, Prince William Co., Va. Is controlled by the Virginia-Carolina Chemical Co.

Property has a large lenticular body of iron pyrites carrying up to three-fourths of 1% copper recovered as a by-product after roasting.

Development is by shaft, equipment including a steam hoist and air compressor. Mine employed 50 men at last accounts.

CABLE CONSOLIDATED MINING CO.**MONTANA**

Office: 49 Silver Bow Blk., Butte, Mont. Mine office: Cable, Deer Lodge Co., Mont. H. C. Bacorn, supt. Lands, 20 miles west of Anaconda, include the Cable gold mine, in vicinity of the Southern Cross mine, and apparently opened on the same orebody. The Cable mine, worked since 1870, with varying success, has produced about \$4,000,000 worth of ore, with values mainly in gold, but has auriferous copper ore on the tunnel level, and shipped 541 tons of ore averaging 3.84% copper, 1906-07, to the Washoe smelter. Equipment includes steam power, air compressor and a 30-stamp mill. Reopening planned for 1913-14.

CABRERA; EPIGMENIO.**MEXICO**

Office and mine: Guachinango, Mascota, Jalisco, Mex. Lands, 30 hectares, showing large orebodies, carrying values in copper, silver and gold. There are some old workings, with limited development of a recent date. Idle several years.

CACTI GROUP.**NEW MEXICO**

W. R. Fiske, owner. Mine at Oro Grande, Otero Co., N. M. Property comprises the Cacti, Jack and Dorie Irene claims on an extension of the

surface croppings of the By-Chance mine, carrying free gold. Developed by 140' shaft on Cacti claim, showing sulphide ore carrying gold values and by 35' shaft on the Jack claim cutting black ore assaying 2% copper and \$2 gold.

CACTUS COPPER CO.

MONTANA

Office: 708 Lonsdale Bldg., Duluth, Minn. Mine office: Radersburg, Broadwater Co., Mont. Wm. A. Eaton, pres.; A. O. Rabideau, sec. Organized about Aug., 1909, under laws of Minnesota, capitalization \$5,000,000, shares \$5 par; issued \$2,828,345. Was a reconstruction of the Cactus Development Co. Is controlled by the Lycoming Co., through ownership of 227,150 shares, or about 40% of the issued capitalization. Company has a large share interest in the Summit Gold Mining Co. and owns 51% of the capital stock of the Pinto Creek Copper Mining Co. and early in 1913 acquired the Sunday mine and other claims of the Royal Mountain Mining Co. in Granite county, Mont., paying \$50,000 therefor in easy installments.

The Royal Mountain property comprises 5 patented and 3 unpatented claims, on the western slope of Royal mountain, about 11 miles from Maxville. Development consists of about 3,000' of tunnels.

In Sept., 1913, company also acquired control of the Duluth Toroda Co.'s property comprising 5 claims in the Myers Creek mining district, Wash. The Cactus Co. originally began operations on a copper prospect in Arizona, which early proved unsuccessful. These operations are very fully described Vol. IX.

CACTUS MINE.

UTAH

At Newhouse, Beaver Co., Utah. Owned by Consolidated Nevada-Utah Corporation.

CADENA DE COBRE MINING CO.

MEXICO

Address: care C. A. McDonald, sec., Bisbee, Ariz. Mine office: Sahuaripa, Sonora, Mex. Emil Marks, pres.; C. H. Holz, vice-pres.; M. Newman, treas.; R. F. Koehler, J. Pennypacker and John Treu, directors; Arthur Houle, cons. engr. Organized Jan. 5, 1905, capitalization \$1,000,000, shares \$1 par. The former directors issued to themselves 550,000 shares of stock, and when this was learned the old board resigned and suit was brought, resulting in the cancellation of the stock so issued, it having been a grab, pure and simple.

Lands, 84 hectares, in Los Chinos mountains, on the Yaqui river, showing iron outcrops up to 300' in width. Development is by the 96' Bisbee tunnel, showing ore assaying 4 to 25% copper, with small gold and silver values, and 2 shorter tunnels. Idle on account of revolutionary disturbances in Mexico. Property was fully reported on by Arthur Houle, E. M., Oct., 1910.

CALAMONT COPPER CO.

MONTANA

Office: 263 Twelfth St., Oakland, Cal. Mine office: Norris, Madison Co., Mont. Walter V. Harrington, pres.; Wm. F. Davis, vice-pres.; Mark E. Davis, managing director; Hugh J. Leonard, sec.; Thos. F. Hogan, treas.; preceding officers, Jas. Keller and F. G. Crist, directors. Organized Nov., 1909, under laws of Arizona, capitalization \$5,000,000, shares \$10 par, non-assessable. Apparently is connected in management with the Montana-Hecla Mining Co.

Lands, 22 claims, area 440 acres, include the Old Colony group, adjoining the Montana-Hecla, 5 miles southeast of Norris, carrying auriferous and argentiferous copper ore. Development includes several shallow shafts, with an old 100' two-compartment shaft on the Big Jack claim, and a 160' tunnel, with about 900' of workings. Was employing about 8 men at last accounts. Not regarded favorably by late H. J. Stevens. A report on the

property made by Reeves Davis, E. M., Sept., 1911, recommended development of 2 surface outcrops.

CALAVERAS COPPER CO.**CALIFORNIA**

Office: 87 Ames Bldg., Boston, Mass. Mine office: Copperopolis, Calaveras Co., Cal. Chas. M. Hayden, acting pres.; Herbert Goff, sec.-treas., preceding officers, Oliver Ames, F. Lothrop Ames, Samuel Carr, Gilmer Clapp, Theo. Lurman, Wm. J. Maloney, John S. Ames, directors; Josiah H. Trerise, gen. mgr.; Nicholas Treloar, mine supt.; Thos. Cameron, mill supt. Organized Aug. 31, 1909, under laws of Delaware, capitalization \$5,000,000, shares \$5 par, reduced, Aug. 24, 1910, to \$2,500,000, shares \$5 par; issued, \$1,868,750. Bonds, \$450,000, 6%, \$90,000 due annually, owned by the Ames estate, which formerly owned the property. State Street Trust Co., Boston, registrar; Federal Trust Co., Boston, transfer agt. Stock is listed on the Boston curb. Annual meeting, second Monday in February.

Lands, 2,833 acres, including the Union, Keystone and Empire mines, and also including ranch and water power lands, bought Aug. 31, 1909, of Union Copper Co., 14 miles from Milton, the nearest rail point. Mines, opened 1861, were considerable producers, paying fair dividends, 1861-66, and yielded 125,739 tons of ore, said to average 10% copper, 1861-1907.

Ore occurs in amphibolite schists underlying Mariposa slates, near intrusions of granodiorite, the ore-bearing schist ranging 100 to 200' in width. Ore occurs as lenses of about 15' average and 70' maximum width, connected by stringers, reported by company to yield one-fifth smelting ore, of 8% copper tenor, and four-fifths concentrating ore, of 3% tenor, giving an average of about 4%. The alteration zone, about 30' in depth only, carried rich oxides and carbonates and some native copper and is succeeded by chalcopyrite, without gold or silver values, but free from arsenic, antimony, zinc, bismuth and other undesirable elements, blister copper therefrom making good wire bars without electrolytic refining.

The strike of the vein is proven for 8,000' by 20 shafts, mainly old workings of little present value. Principal development is on the Union, Keystone and Empire mines, with about 3 miles of workings. General Manager Trerise estimates ore reserves, including probable ore, to the 800' level, at 10,500,000 tons.

The Union mine has the 800' main shaft, with double-drum hoist; No. 2 shaft, 500'; No. 3 shaft, 500'; No. 4 shaft, 80'; No. 5 shaft, 100', and No. 6 shaft, 50'.

The Empire mine has the 280' two-compartment Main shaft, without equipment; No. 1 shaft, 60', No. 2 shaft, 50', and No. 3 shaft, 35'.

The Keystone mine has the 500' Main shaft, vertical to the 4th level and inclined to the 7th level, connected with the main workings, but with no equipment, and the 400' three-compartment Discovery shaft, connected by upraises with the main workings.

The North Keystone mine has the 300' Old shaft and the 300' two-compartment New shaft, with a small hoist, about 2,000' north of the Union shaft, and on the same vein.

Equipment includes a 1,000-h. p. steam plant at the Union mine, with 3 hoists and 15-drill Nordberg and 5-drill Leyner air compressors; company also reports 500 electric h. p. at the mill and same at the smelter.

The company owns about 60 buildings, including a 2-story 10-room office building, boarding houses, bunk houses, a stone warehouse, brick warehouse and frame warehouse, a good machine shop, smithy, 3 barns and about 40 dwellings. The 600-ton mill, 75x200', of steel frame, is connected with the mines by a 4,000' electric tram. A dam, impounding water for the mill, is planned to have 90,000 gals. storage capacity.

The smelter, treating about 130 tons daily in July, 1913, is connected with mill and mines by 4,000' of electric and horse trams. A 100-ton Orford smelter, installed 1899, was burned, 1904. The present smelter, with steel frame, of 300 tons rated daily capacity, has 2 McDougal calciners, a 150-ton blast furnace and a 150-ton reverberatory furnace. The converter has 2 Allis-Chalmers stands. Smelter fuel is petroleum and coke.

Property is said to have 140,000 tons of ore mined ready for smelting, and is estimated to have blocked out 600,000 tons of ore. Production was begun July, 1912, and to June, 1913, totalled 164 cars, approximately 7,000 tons of ore, about 100 tons of it being roasted ore from a 40,000-ton stock pile that has been untouched for several years past, the whole averaging between 9% and 11% copper, shipped to the Selby Smelting & Lead Co. The concentrator was treating around 600 tons of 3 to 4% ore daily, June, 1913. Total output of copper from all sources at this time was at the rate of about 10,000,000 lbs. per year. The management estimated cost of blister copper at 8.33 cts. per lb., laid down in New York, or, if marketed on the Pacific Coast, at 7.83 cts. per lb., which figures do not seem warranted, but the property is by no means devoid of merit, though market manipulation of the stock has been of a flagrant nature, stock selling up to \$11 and afterwards down to \$2.50 during 1910 and again in 1913. The company was hard pressed for funds in 1913 and the manager attached the property for \$18,000 unpaid salary; there is talk of receivership proceedings. The stock has been persistently praised by a prominent New York curb house, producing an unfavorable impression on conservative investors.

CALEDONIA GOLD & COPPER MINING CO.

IDAHO

Office: Wallace, Idaho. Mine office: Wardner, Shoshone Co., Idaho. A. B. Campbell, pres.; Chas. McKinnis, sec. and mgr. Has paid total dividends of \$52,000. Mine, near the Bunker Hill & Sullivan, is opened by a 500' shaft, and 2 tunnels, lower tunnel 3,099' in length giving a back of about 1,300'. Property shows a strong fissure vein with an ore shoot 1,000' long that is in places 50' wide, and carries cupriferous silver-lead ores, averaging 15 to 20% lead, 40 oz. silver, with a little native copper.

Equipment includes an electric hoist, air compressor and electric pumps. Employs about 50 men when active. Idle since 1912 and in litigation with the Bunker Hill & Sullivan Mining Co., based on the apex law.

CALIFORNIA-ARIZONA COPPER CO.

ARIZONA

Idle. Mine office: Wellton, Yuma Co., Ariz. F. A. Meyer, supt., at last accounts. Mine has tunnels of 100' and 160', with but slight development.

CALIFORNIA DEVELOPMENT CO.

ARIZONA

Mine office: Wenden, Yuma Co., Ariz. W. W. Gnash, supt., at last accounts. Property is the Ranier mine. Ores are copper and gold. Mine is developed by shaft and employs about 25 men when active. Has a small gasoline hoist and air compressor. Presumably idle.

CALIFORNIA GOLD & COPPER CO.

CALIFORNIA

Office: 859 Main St., Riverside, Cal. Mine office: Vontrigger, San Bernardino Co., Cal. A. H. Cram, pres. and gen. mgr.; C. W. Page, vice-pres.; H. C. Hibbard, sec.; Citizens Bank, Riverside, treas. Organized 1904, capitalization \$500,000. Lands, 9 claims, patented, 2 miles from Vontrigger and 18 miles west of the Colorado river, known as the Vontrigger or Cram mine, carrying contact deposits between granite, quartzite and limestone, with diorite dikes.

Property is claimed to carry 8 clearly defined parallel veins of slightly auriferous copper ore, in 2 ore zones of 200 to 300' width, with outcrops traceable 5 miles. Ore is oxidized to depth of 80', and formerly was reported to range 9 to 15% in copper tenor, with fair gold and silver values, sec-

ceeded by slightly auriferous bornite and chalcopyrite. Main vein is claimed to be 826' wide at surface, and more than 500' wide on the 300' level, and mine is claimed to have large bodies of 4% copper ore, with gold and silver values. Mine has shafts of 100', 150' and 317', and a 350' tunnel, not having been deepened for several years, and has about 2,000' of workings.

Equipment includes a 100-h. p. gasoline engine, 15-h. p. hoist and a small air compressor housed in a power building variously reported as 18x34' and 30x60'. Water is brought 6½ miles from Hackberry springs, through a steel pipe line, having 1,100' fall to a 40x50x7' reservoir, cement roofed, of 100,000 gal. capacity.

The 100-ton copper leaching plant has a Sampson crusher, 2 sets of Davis rolls, automatic mixer and grinder, agitating tank and 4 precipitating tanks, designed to extract copper electrically. There is an 1,800' flume for wasting tailings and four 40-ton cyanide tanks. Employed 15 men when active.

The mine is claimed to have shipped carload lots of ore returning 8.7 to 10.9% copper, with small gold and silver values, and it was claimed, July, 1909, that 30,000 tons of ore was on the dump, which may or may not have been true. Company apparently has confined operations, for several years past, to building a mill and selling stock, without continued mine development. Is not regarded favorably.

CALIFORNIA GOLD & COPPER CO.

CALIFORNIA

Idle. Mine office: Spencerville, Nevada Co., Cal. C. C. Bitner, pres.; Otto Noehler, gen. mgr., at last accounts. Lands, 65 acres, 3 miles north of Spencerville, and 17 miles from nearest railway station, Wheatland, on the Southern Pacific railway, with good wagon road connection. Property shows a gossan of limonite and iron-stained diorite, underlaid by a 4' fissure vein, in diorite, with strike N. 48° W. and dip of 50° N. E., carrying good grade auriferous and argentiferous malachite, bornite and chalcopyrite, associated with pyrite, in quartz gangue. Mine has a 1,000' main tunnel, with back of 225', and about 1,600' of workings. A little high-grade ore was shipped to Shasta county smelters.

CALIFORNIA & MASSACHUSETTS COPPER MINES CO.

CALIFORNIA

Inactive. Property, at Red Bluff, Tehama Co., Cal., is leased, for 99 years, to Chicago Copper Refining Co. Described Vol. VIII.

CALIFORNIA MOUNTAIN MINING CO.

COLORADO

Idle. Mine office: Eureka, San Juan Co., Colo. A. H. Kunkle, supt., at last accounts. Has auriferous and argentiferous ores of lead, copper and zinc, developed by tunnel. Has electric power and an air compressor.

CALIFORNIA-NEVADA MINING & MILLING CO.

CALIFORNIA

Inactive. Property located at Bishop, Inyo Co., Cal. Described Vol. X.

CALIFORNIA-UTAH GOLD & COPPER MG. CO.

CALIFORNIA

Secretary and office: H. S. Stowe, 201 Boston Bldg., Salt Lake City, Utah. Mine office: Doyle, Lassen Co., Cal. J. W. McDermott, pres.; Geo. S. Hayes, vice-pres.; A. W. Long, treas.; J. R. Dumont, mgr.; preceding officers and H. S. Barnhart, directors. Organized June, 1912, under laws of Utah, capitalization \$100,000, shares 10 cts. par; issued, \$60,000.

Property, 7 claims, 12 miles west of Doyle, is heavily timbered and shows a 40' fissure vein in porphyry and diorite, striking northwest and southeast, with a dip to westward of 70°, traceable for a distance of about 2,000'. Ores contain bornite, with occasional showings of native copper, averaging 7 to 10% copper, with small gold values.

The mine is opened by numerous open cuts, and a 65' two-compartment

shaft, 4x8' inside of timbers. Equipment includes a steam hoist good for 1,000', a smithy, boarding house and other necessary mine buildings.

Property considered promising.

CALHOUN CONSOLIDATED MINES CO.

COLORADO

Mine office: Central City, Gilpin Co., Colo. Property, under lease to Mountain State Investment Co., consists of 8 claims, on the east slope of Quartz hill, developed by 4 shafts, showing fair values in gold, silver and copper.

CALUMET & ALGOMA MINING CO.

ONTARIO

Secretary's address: Lucas Hermann, 109 Fifth St., Calumet, Mich. Mine near Massey, Algoma, Ont. Christian Schenck, pres.; Jos. Vertin, vice-pres.; Lucas Hermann, treas. Organized 1905, capitalization \$1,000,000, shares \$5 par, assessable; issued, \$100,000, paid in, \$1.75. Was a reconstruction of the Copper Queen Mining Co., Ltd. At last accounts had no debts, with \$600 in the treasury.

Lands, 957 acres, freehold, showing a 45' fissure vein, traceable about 3 miles, carrying medium-grade chalcopryite ore, more or less auriferous, with occasional bornite and malchite, giving assays of 5 to 25% copper. Has 2 shafts, No. 1 being 138' deep, and 2 tunnels, longest 195'. Lands are heavily timbered and well watered. Idle several years.

CALUMET & ARIZONA MINING CO.

ARIZONA

Office: Calumet, Mich. Mine office: Warren, Cochise Co., Ariz. Works office: Douglas, Cochise Co., Ariz. Chas. Briggs, pres.; Capt. Jas. Hoatson, vice-pres.; Capt. Thos. Hoatson, second vice-pres.; Gordon R. Campbell, sec.; Peter Ruppe, treas.; preceding officers, Thos. F. Cole, Chester A. Congdon, Chas. d'Autremont, Jr., William E. Corey and Geo. E. Tener, directors; John C. Greenway, gen. mgr.; W. B. Gohring, mine supt.; James Wood, smelter supt.; J. H. Whiteley, engr.; W. B. Congdon, purch. agt.; Geo. Arnold, supt., Courtland mine; John Hooper, supt. at Superior, and J. Curley, supt. at Ajo. Organized March, 1901, under laws of Arizona, capitalization \$2,500,000, shares \$10 par, increased Feb. 15, 1911, to \$6,500,000, shares \$10 par; issued 615,008 shares; held for exchange, 29,504 shares. The company controls the Superior & Pittsburgh Copper Co., through ownership of 1,396,528 shares out of a total of 1,499,792 shares issued for which the company exchanged 399,008 shares of its own capital stock, basis of exchange being $3\frac{1}{2}$ shares Superior & Pittsburgh for 1 Calumet & Arizona. American Trust Co., Boston, registrar; State Street Trust Co., Boston, transfer agent. Stock is listed on the Boston Stock Exchange. Annual meeting, second Monday in April.

Balance sheet of Dec. 31, 1912, gave quick assets of \$1,701,987, including \$281,379 cash, with accounts payable of \$261,126. Has paid dividends as follows: \$2 in 1903; \$6.50 in 1904; \$8.50 in 1905; \$13 in 1906; \$16.50 in 1907; \$4 in 1908, 1909, 1910, 1911 and \$4.25 in 1912, a total of \$66.75 per share. Grand total to end of 1912, \$16,231,840. Dividends, 1913, were \$1.25 quarterly.

Lands include the original claims at Bisbee, the Mammoth group, bought 1907, the American Saginaw group, in payment of which the company issued 16,000 shares treasury stock in 1912 and various other properties in Arizona and Sonora, held under bond and lease.

The Calumet & Arizona mine proper includes 12 claims, patented, area 178 acres, adjoining the Copper Queen, side-line agreements with the Copper Queen insuring freedom from possible litigation, and continuance of the exceedingly neighborly relations existing from the very inception of this company. The mine is opened in limestone, near a porphyry contact, with occasional porphyritic intrusions. The surface gives small indications of

values, showing but small and infrequent outcrops, the existence of the Irish Mag orebodies having been inferred from underground work in the adjoining shafts of the Copper Queen, after careful study of the general geological conditions of the district. Ore occurs in highly irregular bodies, the mine having native copper, cuprite, melanconite, malachite, azurite, chalcocite and chalcopryrite, usually with a talcose gangue, and with considerable hematite and manganese ores, the latter carrying malachite in small disseminated nodules, frequently averaging 10 to 18% in copper. The ore, which is practically self-fluxing, averages about 2 oz. silver and 0.05 oz. gold per ton, as smelted. Diamond-drill borings to depth of 1,800' have penetrated limestone strata to that depth. The orebodies are extensively developed, but are not largely blocked out, owing to the constant shifting of the ground, caused by the creeping of the mountain above, as is the case at the neighboring Copper Queen mine, requiring very heavy timbering, with frequent bulkheading, and constant care for all openings, which renders it prudent to keep costs down by blocking out ore but a comparatively short time ahead of actual stoping requirements. Timber is secured from a great distance, and to guard against emergencies, large stocks are carried. The mine as a whole is not especially wet. Several small mine fires have caused trouble, but have not done serious damage. New openings were 25,346' in 1912, and average about 5 miles yearly. The mines have electric traction on the 1,150' level.

The 4-compartment Irish Mag shaft, sunk on a single 20-acre claim, was the original mine, and the shaft is sunk in hard limestone throughout, except where occasional orebodies were cut, rendering it unusually safe from drawing. The Irish Mag has yielded some of the best copper ore ever mined, including some entire stopes of 30 to 40% copper tenor. The Irish Mag shaft has a 78' steel headgear, a 114' ore bin and a 250-h. p. electric hoist, raising 3-decked cages. The shaft is 1,350' deep. The Oliver shaft, 4 compartments, 1,600' deep, develops both of the Senator claims, cutting ore at 710'. The upper workings show high-grade oxidized ores and the lower workings carry rich sulphides, having large bodies of oxide and sulphide ores from the 950 to 1,250' levels. Important new orebodies were cut, 1912, on the 1,250' and 1,350' levels. The Oliver has a 600-gal. Nordberg electric pump and is equipped with a powerful Nordberg electric hoist.

The Powell shaft, started Nov., 1908, is on the line between the Hope and Wagner claims, which lie 2,000' southwest of the Irish Mag shaft, adjoining the Pittsburgh & Duluth mine of the Superior & Pittsburgh. This ground was explored by a crosscut from the Irish Mag that traversed 600' of the Copper Queen ground, stopping about half way across the group, showing nothing of value. This shaft, about 600' deep, has an electric hoist.

The Buckeye claim has been explored and slightly developed, by crosscuts from the Oliver shaft and from the Cole shaft of the Superior & Pittsburgh, but with little success. Considerable work was done, 1912, on the 1,150', 1,250' and 1,350' levels, but disclosed little or no ore save at the east end of the claim where the 2 lower levels showed extensions of the big orebody found above.

The Gibraltar claim, which is the southernmost, wedges into the holdings of the Superior & Pittsburgh. The Gibraltar has several exploring shafts and trenches, showing iron and a little low-grade copper ore of promising appearance, though below commercial tenor, and good ore was opened, 1910, in a drift on the 1,250' level from the Oliver shaft.

The area below the 1,350' and 1,450' levels was diamond drilled, 1911, showing a downward extension of the mineral zone, several hundred feet to the bottom of the limestone, but without disclosing commercial ore.

The Washington, Angel and Old Republic claims lie on the porphyry side of the gulch, and were secured mainly as a possible smelter site, then being considered of little promise for ore, but, in view of recent developments in the camp, these claims are of possible mineral value. The Copper Queen Consolidated Mining Co. has recently found considerable ore in this formation in close proximity to this group.

The surface equipment is very complete. The original machinery plant was clustered about the Irish Mag shaft, on a steep hillside, where limited room was secured by grading, but the principal plant is now at the Oliver shaft, including five 280-h. p. marine boilers, burning crude petroleum, with storage tanks.

The principal compressor plant, at the Oliver, has a 35-drill Sullivan Corliss cross-compound 2-stage air compressor, with 17x34" steam cylinder and 20x34" air cylinder, having a piston displacement of 6,600 cu. ft. of free air per minute. There also are 3 Sullivan straight-line air compressors. Much of the ore is so soft that it can be bored with a breast auger, thus reducing requirements in the way of air for power drills. Electricity is used extensively on surface and also for pumping. The electric power plant at the Oliver shaft has 1,000-kw., 500-kw. and 300-kw. Westinghouse-Parsons 2,200-volt 60-cycle 3-phase turbo-generators, two 220-kw. 2,200-volt 60-cycle 3-phase motors, direct-connected with the steam turbine, a 300-kw. General Electric rotary converter, transforming a 2,200-volt alternating current to a 550-volt direct current, for operating the street-car line to Warren, four 40-h. p. Buffalo vertical engines, direct-connected to four 25-kw. 115-volt Crocker-Wheeler generators for electric light and power for ventilating fans, and various minor electrical machinery.

The steel-frame machine shop is divided into two 60x48' parts, for the machine shop and smithy. Adjoining is a plate shop, 40x128' of steel frame, with corrugated iron roof and siding. There is a framing mill at the Irish Mag shaft, also a warehouse and office building. A 60x125' administration building is planned to be erected at Warren, the town site adjacent to the Calumet & Arizona and Superior & Pittsburgh mines. A hospital with an efficient staff is maintained for employees, and a model changing house has hot and cold running water, tub and shower baths and lockers for 500 men. Fire protection is furnished by direct pipe lines to large storage tanks, giving an effective pressure of 100 lbs., with hose houses and hose carts at each shaft, all hose couplings being made to connect with those of the Bisbee fire department. An automatic telephone system has 25 stations underground and on surface, and is connected with the smelter at Douglas.

The Mammoth group, at Copper Creek, Graham county, Ariz., includes 35 claims, known as the Scanlon or Clark-Scanlon property, 16 miles northeast of Mammoth. This property, bought Sept., 1908, has been extensively tested by diamond drills, giving good cores, and has a 600' two-compartment working shaft, with several levels opened, and considerable medium to high-grade sulphide ore is blocked out. A 15-mile railway will be required to render this property a producer.

The American-Saginaw mine, comprising 28 claims, includes the American group of 9 claims, lying next east of the Junction, the Saginaw group of 17 claims, area 297 acres, also favorably located, and the Muheim and World's Fair claims. Mine has an old 384' shaft, sunk at an angle of 70° with the horizon, showing 35' of leached ore on the 300' level, and a new 1,100' three-compartment shaft connected with the Denn-Arizona, which cut a 35' body of low-grade ore on the 350' level. A considerable body of ore was found on the 750' level of the Saginaw, with prospects of commercial ore at greater depth. Development on adjoining properties indicates

strongly that the ores of the American-Saginaw probably will lie 1,800 to 2,000' in depth.

The Courtland mine, at Courtland, Cochise county, Ariz., about 35 miles north of Bisbee, bought for about \$200,000, is developed by the April Fool, Germania and Miami shafts, 2 former of 500' depth each. The mine, reopened July, 1912, after a short period of idleness, is again producing regularly at the rate of about 100 tons of ore daily, shipping oxide ores to supplement diminishing supplies of this class of ore mined at Bisbee. The Courtland mine had approximately 23,000 tons of 5% ore available, Feb., 1913, with possibilities of finding new orebodies rather doubtful.

A bond on the Superior mine near Lordsburg, Grant county, N. M., was forfeited, 1911, developments resulting in the disclosure of ore too low grade to make the property attractive at the high price asked.

The San Felipe mine, in the Arizpe district of Sonora, Mex., includes 260 hectares of mineral lands and nearly 1,000 hectares of adjoining ground, giving total holdings of about 3,000 acres.

The Ajo property, consisting of the New Cornelia mine and several adjoining claims, in the Ajo district, 42 miles south of Gila, includes 2 claims owned outright and 41 claims held under option. Diamond drilling and test pitting, 1911-13, disclosed a large body of ore, estimated to contain 27,000,000 tons of 1.7% copper ore, amenable to treatment by the company's leaching process, and a valuable steam shovel mine is promised. The New Cornelia claims, area 243 acres, taken over Oct., 1913, for a payment of about \$800,000. Under this option the Calumet & Arizona Mining Co. receives treasury stock of the New Cornelia Copper Co. for all money expended in development work on the property, and its interest, when the deal is consummated, will be approximately 65% of all issued stock.

The Daggs-Newman group of 63 claims, and 26 additional outlying claims, near Superior, in the Pioneer district, are held under options, requiring no payments to be made before 1915. The property is being developed by shaft and tunnel, former 480' deep and latter 900' long. June, 1913, shaft and tunnel being connected at depth of 180' below collar of shaft.

The company has 2 smelters, both located at Douglas, 25 miles from the mine, receiving ore over the El Paso & Southwestern railway, at a very favorable freight rate. The old smelter was blown in Nov. 15, 1902, the plant enlarged, 1907-08, and again enlarged, 1910, giving the old works a capacity of nearly 3,000 tons daily.

The new smelter, completed 1913 at a cost of about \$2,000,000, was designed by C. H. Repath and built and equipped with the able assistance of Messrs. Greenway and Wood. The works consist of a sampling mill, crushing plant, calcining plant, reverberatory, blast furnace and converter departments and 6 mixing beds each of 10,000-tons capacity, together with a 5,000-ton coke storage bed.

The crushing and sampling plant, 40x84' on the ground and 5 stories high, is built of steel and concrete throughout, and is divided into 2 sections, operating independently of each other. Each section has a crushing and sampling department. Ore from the crushers at the receiving bins is delivered over an incline conveyor to the crushing and sampling plant, where the large sizes are screened out for the blast furnaces. The sampling department, equipped with Snyder automatic samplers, cuts the ore 4 times, making a sample weighing 1.6 or 3.2 lbs., as desired, per ton of ore passing through. The plant is flexible and ore may be crushed and screened and discharged at any desired size.

The material from the sampling and crushing plant is passed to mixing beds similar to those in use at the Cananea smelter, there being 3 beds for

coarse and 3 for fine ore. The coarse ore mixed with coke is conveyed directly to the coke charge bins over the blast-furnace charge floor, the fine ore going directly to the calciner, or roaster plant.

The roaster plant has twelve 258" Herreshoff roasters, having a capacity of approximately 80 tons of fine ore per day. The plant is equipped with a tile and steel dust chamber, 60x140x70' high, equipped with baffles and wires and roofed with copper, discharging into a brick-lined steel chimney, 20' inside diameter by 279' high.

A 222x460' building, of steel frame, sheathed with iron, covers the blast furnace, reverberatory, converter, and copper-casting departments. The blast-furnace department consists of two 48x40' blast furnaces, and has a steel dust chamber, 60x180x70' high, equipped with suitable baffles and wires. The gases from the converters will also pass through this chamber and be discharged into a brick-lined steel chimney, 25' inside diameter by 305' high. Ore and coke is discharged directly from the bin over the charge floor into cars resting upon platform scales, the charge car being propelled from the scales to the charge doors of the furnace by an electric motor.

The reverberatory department contains 4 reverberatory furnaces, 19x100' in size, with a foundation and building for a fifth furnace in place. Each furnace is equipped with two 712-h. p. Stirling boilers. The furnaces are charged directly from the calcine cars running on a track overhead. Matte is tapped into 20-ton pots, and transferred by cranes to the converters, slag being skimmed directly into 25-ton pots, running on tracks underneath and just in front of the skimming end of the furnaces.

The converter department, having a main converter aisle 55' wide, and two 40-ton electric traveling cranes, has stands for 6 Great Falls type converters. There are also 2 straight-line casting machines and other necessary equipment. The converter slag is poured directly into the reverberatory furnaces.

The power house, formerly 80x160' in size, was increased, 1907, by the building of a transverse section 100x100' in size, the new building being divided through the center by a row of columns into 2 bays, each 50' wide, and each served by a 10-ton hand-power traveling crane. Equipment includes a 500-kw. 440-volt 60-cycle 3-phase Allis-Chalmers-Parsons turbo-generator, a 160-kw. synchronous motor generator set, which can be run to furnish electric energy at various voltages, and with either an alternating or direct current; an 850-h. p. Nordberg steam engine; a 400-h. p. engine running 2 Nordberg air compressors, with cross-compound steam ends having 22" and 42" cylinders and 48" stroke, and air cylinders of 48x48", giving a 12 lb. blast pressure; 1 Murray-Corliss tandem-compound engine with 14" and 28" cylinders and 36" stroke, direct-connected to a Connersville No. 10 blower; a pump of 5,000 gal. per minute capacity; 2 Prescott compound vertical-beam condensers, having steam cylinders of 14" and 25", with 24" stroke; two 36x24" vacuum pumps; a direct-acting Prescott pump for circulating water; a 500-gal. Prescott compound duplex mine pump for furnishing hydraulic power for converter stands, and various minor engines, the power house having machinery with an aggregate of 3,750 h. p.

The boiler house of the power plant has 250-h. p. and 280-h. p. boilers, burning petroleum, with four 45,000-gal. oil tanks for storage. Water in ample supply is secured from flowing artesian wells, of 450' average depth.

The smelter plant includes a machine shop and smithy, both of steel frame, and a considerable number of dwellings.

Average forces, 1912, were 1,347 men, of whom 692 were at the mine

and 655 at the smelter. Sunday work was discontinued, Aug., 1910, at the request of employees.

Ore smelted gave average returns of 7.7% copper in 1904; 7.9% in 1905; 7.95% in 1906; 5.85% in 1907; 4.97% in 1908; 5.15% in 1911 and 5.07% in 1912. Costs have ranged from the low point of 5.71 cts. per lb. in 1906, to the high point of about 10.5 cts. per lb. in 1907.

Production has been as follows: 1,200,000 lbs. copper in 1902; 25,535,857 lbs. in 1903; 31,634,895 lbs. in 1904; 31,772,896 lbs. in 1905; 36,934,387 lbs. in 1906; 30,039,473 lbs. in 1907; 28,048,329 lbs. in 1908; 27,747,853 lbs. in 1909; 28,031,924 lbs. in 1910; 21,476,739 lbs. in 1911, and 16,490,229 lbs. in 1912. The combined output of this and the Superior & Pittsburgh Co. was 49,945,905 lbs. fine copper in 1911, 53,108,628 lbs. in 1912 and for first 8 months of 1913 was 37,650,000 lbs. copper, compared with 40,092,000 for same period in 1912.

The merger of the Pittsburgh & Superior Copper Co. in the Calumet & Arizona Mining Co., effected 1911, was logical, and to the best interests of both properties. The Calumet & Arizona had a large cash surplus, a smelter, and a mine good for some years, though one that has passed the crest of production, while the Superior & Pittsburgh has a magnificent mine, with tremendous ore reserves, but has found its ore so deep, and its mine so wet, that the cost of development has been very heavy. The Superior & Pittsburgh also lacked smelting facilities and the large cash resources of the Calumet & Arizona. The merger plans were fixed after the appraisal of both mines by Dr. L. D. Ricketts and Jas. L. Douglas, who, with a number of assistants, spent about 2 months in careful study of the properties. After payment of dividends, the new consolidated company started business, May, 1911, with a surplus of about \$3,500,000 in quick assets, and with a productive capacity of at least 60,000,000 lbs. fine copper yearly. The management is excellent in all respects.

CALUMET & BISBEE DEVELOPMENT CO. ARIZONA

Office: Houghton, Mich. Mine near Bisbee, Ariz. Jos. Bosch, pres.; F. W. Nichols, sec.-treas. Organized Oct. 20, 1902, under laws of Arizona, capitalization \$400,000, shares \$10 par; issued 25,300 shares.

Lands, 4 claims, area 49½ acres, at Don Luis, adjoining the Lake Superior & Pittsburgh property of the Calumet & Arizona Mining Co. The mine has a 960' shaft, showing a little ore in the bottom. Idle since 1904 for lack of working capital.

CALUMET & COPPER CREEK MINING CO. ARIZONA

Address: Sanford H. Hudson, sec., Benson, Minn. Mine office: Copper Creek, via Winkelman, Ariz. R. Roy Sibley, gen. mgr.; C. S. Gelser, supt.; Col. Frank J. Sibley, pres.; Martin E. Tew, vice-pres.-treas. Other directors, Chas. H. Robinson, E. Osterholm and John B. Wright. Organized March, 1910, as successor to Copper Creek Mining Co., capitalization \$5,000,000, shares \$10 par; issued, \$3,750,000. Bonds \$1,500,000, at 6%, authorized; \$280,000 issued. Standard Trust Co., New York, registrar. Annual meeting, first Monday in April.

Lands, 2 claims, unpatented, area 400 acres, also 100 acres in mill and smelter sites, 500 acres timber lands, and 1,000 acres miscellaneous lands, giving total holdings of 2,000 acres in the Bunker Hill district, Graham and Pinal counties, Ariz. Properties lying in the Copper creek basin, on the western slope of the Galiuro mountains, 31 miles south of Winkelman and the Arizona Eastern railway. Property includes the Sycamore Flat, Cumberland, American Eagle, Prince and Old Reliable groups. Country rock is diorite, with porphyry intrusions, showing a large number of ore-bodies, there being several different breccias and oxidized zones carrying mineral, orebodies usually being elliptical, but sometimes occurring in

chimneys. Outcrops are very prominent. Oxidized ores, including chrysocolla, are found at and near surface, sometimes in commercial quantities, giving place, at shallow depth, to sulphides, which are chalcopryite, bornite and chalcocite, associated with pyrite, in altered and brecciated diorite, some native copper showing in flakes and grains along shear zones. Company reports that 1 orebody 425' wide and 300' long has been developed to 342' depth, in porphyry breccias. Property includes a water right, 16 miles from the mines.

The Old Reliable mine has 2 orebodies, 1 with the largest outcrop in the district, said to have a sectional area of about $3\frac{1}{2}$ acres. Development is by an upper tunnel, with back of 340', and a 650' lower tunnel, with about 2,000' of workings, estimated by manager to show 200,000 tons of 3.75% ore ready for stoping.

The American Eagle group has 3 prospect tunnels, a 2,500' working tunnel, and a 300' three-compartment shaft, with about 3,500' of workings, showing oxidized ores at surface, with an orebody reported to be developed for about 50x100'. This mine has been estimated to have developed about 60,000 tons of ore, averaging 3.78% copper and 8 oz. silver, with a trace of gold. The mine has electric light underground, and equipment consists of a 75-h. p. electric hoist, good for 500', a 3-drill and 1-drill electric air compressor, two 150-h. p. boilers, 3 small electric hoists, 2 air compressors, and a number of buildings, including a 20x40' machine shop, 16x20' smithy and 64x72' store, said to carry a \$20,000 stock. Company also has a concentrator, rated at 250 tons, and owns and operates a narrow-gauge railroad, $2\frac{1}{2}$ miles in length, connecting the Old Reliable mine and the mill. This line, the Phoenix & Copper Creek railroad, is to be extended 14 miles to Mammoth. A bond on the Blue Bird, or Cumberland mine, a silver-lead property near Florence, Ariz., was taken in 1912.

The company which, in 1913, began the construction of a 250-ton smelter, should first develop a mine. It was stated in a circular, published in connection with a bond offering, late 1912, that the mines of this company had developed 1,650,000 tons of ore, averaging 3.25% copper, with more than 8,000,000 tons of probable ore, "developed in the present workings, but not fully blocked out for measurement and mining," which figures are considered excessive. Management figures mining costs at \$2.19 and concentration at \$0.805 per ton. Production for 1912 was 6,025 tons of 2.4% ore, partly from old dumps, and yielding 192,082 lbs. fine copper.

The company's circulars state that reports on the property have been made by F. H. Probert, Los Angeles, Prof. Chas. P. Berkey, Columbia University, New York City, and L. Webster Wickes, Salt Lake City, which is untrue as the two first named men have never seen the property, and the third did sampling work only. In an examination of the Old Reliable group made by Mr. Weed, Prof. Berkey made and examined thin sections of several rock specimens gathered in the above-mentioned examination, and his determinations are given in the report on the Old Reliable property. Company was regarded with much suspicion by the late Horace J. Stevens and the financial management of the company in the past 2 years has confirmed his opinion.

CALUMET-CORBIN MINING CO.

MONTANA

Address: care J. Bruce Paton, treas., Laurium, Mich. Mine at Wickes, Jefferson Co., Mont. James Wilcox, pres.; J. A. Maccauley, vice-pres.; M. E. O'Brien, sec.; preceding officers, Frank Hildebrant, F. B. Keyes, C. D. Hohl, W. J. Reynolds and C. E. L. Thomas, directors. W. C. Hosking, supt. Organized in 1908, under laws of Arizona, capitalization \$500.-

000, shares \$1 par, decreased from \$1,500,000, Jan. 17, 1910; 74,000 shares in treasury with \$20,000 demand notes and \$4,000 cash.

Property, 20 acres, near Wickes, developed by 240' shaft with 1,000' of shaft and tunnel workings, said to have cost company \$26,000. Treasurer reports average assay value of \$30 to \$50 per ton for ore in the mine and \$8 per ton for ore on dump.

CALUMET & HECLA MINING CO.

MICHIGAN

Address: 12 Ashburton Place, Boston, Mass. Mine office: Calumet, Mich. Quincy A. Shaw, pres.; Rodolphe L. Agassiz, vice-pres.; Jas. MacNaughton, Francis L. Higginson and Francis W. Hunnewell, directors. Geo. A. Flagg, sec.-treas.; James MacNaughton, gen. mgr.; W. A. Childs, supt.; W. M. Gibson, asst. supt.; E. S. Grierson, chief engr.; E. D. Leavitt, cons. mech. engr.; John Knox, chief mg. capt.; Thos. H. Soddy, supt. of motive power; Ocha Potter, chief efficiency engr.; Fred S. Eaton, chief clerk; E. D. Johnson, purch. agt. Mill office: Lake Linden, Mich., Henry Fisher, supt.; C. H. Benedict, mill metallurgist; Chas. Smith, clerk. Smelter offices: Hubbell, Mich., and Buffalo, N. Y. Jas. B. Cooper, supt. at Lake Linden; Morris B. Patch, supt. at No. 1 Austin St., Buffalo, N. Y.

Organized 1871, under laws of Michigan, with capitalization \$2,500,000, shares \$25 par; paid in, \$12. Charter renewed, 1900, for 30 years, and amended, 1905, under the new laws of Michigan, making the corporation a securities-holding company, as well as a mining and smelting company. Was organized as a consolidation of the Hecla, Calumet, Portland and Scott mining companies. Stock is listed on the Boston Stock Exchange, and traded in on the unlisted department of the New York Stock Exchange. Annual meeting, second Thursday in June.

Balance sheet, of Dec. 31, 1912, gave cash and quick assets of \$11,560,426, with liabilities of \$844,012, leaving a balance of quick assets of \$10,716,414, not including notes outstanding at this date, which were \$4,134,000 at 4%, due Feb. 18, 1919, and \$1,685,000 at 5%, due Feb. 18, 1919, these notes aggregating \$5,819,000. Company carries \$1,000,000 to \$1,250,000 in supplies, which are not listed as an asset.

Dividends were \$5,000,000 in 1905; \$7,000,000 in 1906; \$6,500,000 in 1907; \$2,000,000 in 1908; \$2,700,000 in 1909; \$2,900,000 in 1910; \$2,400,000 in 1911, and \$4,200,000 in 1912. Total dividend disbursements, to end of 1912, were \$119,100,000, or \$1.191 per share, being the largest dividends ever paid by any incorporated mining company, and, in addition, the Hecla Mining Co. and Calumet Mining Co., before their amalgamation under the present title, paid dividends aggregating \$950,000.

Since the change in charter, 1905, permitting the acquisition of stock in other corporations, the Calumet & Hecla has secured control of various other mines and mineral tracts, by organizing subsidiary corporations, and also by acquiring stock in companies previously organized. In 1905 the company bought the following stocks, at a cost of \$8,592,129.99 in cash and notes: 9,600 shares of Osceola; 19,400 shares of Tamarack; 24,796 shares of Ahmeek; 27,507 shares of Isle Royale; 10,316 shares of Seneca; 25,000 shares of Laurium. The attempt to secure physical control of the Osceola Consolidated Mining Co., at the annual meeting March, 1907, was met by determined opposition, which took the fight into the Michigan legislature and the federal courts. After nearly 2 years of strenuous litigation, the Calumet & Hecla secured control of the Osceola and other Lake Superior mining companies formerly under the management of A. S. Bigelow, through a bargain with Mr. Bigelow, by which his entire stock interests were sold to the Calumet & Hecla.

The share holdings of the Calumet & Hecla in subsidiary companies

were as follows on Dec. 31, 1912: 41,000 shares of Allouez Mining Co.; 41,500 shares of Centennial Copper Mining Co.; 19,400 shares of Cliff Mining Co.; 50,100 shares of Gratiot Mining Co.; 152,977 shares of La Salle Copper Co.; 32,750 shares of Osceola Consolidated Mining Co.; 50,100 shares of Superior Copper Co.; 37,550 shares of Laurium Mining Co.; 11,207 shares of Seneca Mining Co.; 30,500 shares of Isle Royale Copper Co.; 24,200 shares of Ahmeek Mining Co.; 19,400 shares of Tamarack Mining Co., and 6,092 preferred shares and 43,202 common shares of White Pine Copper Co. The Frontenac, Manitou, Dana and St. Louis companies have been completely absorbed.

The landed holdings of the Calumet & Hecla, including property owned outright, property controlled through subsidiary corporations, mining lands under option, and timber and miscellaneous lands, in Houghton, Keweenaw and Ontonagon counties, Michigan, amounts to approximately 209,051 acres, of which 102,804 acres are in Keweenaw county. The company, with its subsidiaries, has a water front of more than 34 miles, on the shores of Lake Superior, Lac La Belle and Torch lake, and approximately 60,000 people are supported by the operations of the company and its allied interests.

The Calumet & Hecla mine proper, area about 2,750 acres, lies in a compact tract in Secs. 11, 13, 14, 15, 22, 23 and 24, T. 56 N., R. 33 W., in addition to which the company owns considerable tracts, west of the Tamarack mine, carrying the underlay of the Calumet conglomerate at such stupendous depths that opening would require a 2-mile vertical shaft, and it is very doubtful whether these lands ever will become available for mining on the Calumet conglomerate. The lands west of the Tamarack were explored, 1904, by diamond drill, in search of a supposed cupriferous conglomerate, but nothing of promise was found.

The original Calumet & Hecla mine is opened on the Calumet conglomerate bed, and a parallel mine has been developed on the Osceola amygdaloid, while a third parallel mine has been partly developed on the Kearsarge amygdaloidal bed.

The Calumet conglomerate has proven unprofitable both to the north and south of the Calumet & Hecla, though workable at the Tamarack mine, which has developed the underlay by vertical shafts. The conglomerate has an average strike of N. 39° E., with average dip of 37° 30' with the horizon. The bed is of 8' minimum and 40' maximum width, with an average of 12 to 14', giving about 2,400 fathoms of stoping ground, or about 43,200 tons of stamp rock, per acre. As a rule, the richer portions of the conglomerate are in the central part of the Calumet & Hecla tract. The walls of the conglomerate carry considerable copper, especially the amygdaloidal footwall, and much of the adhering trap rock formerly rejected is now milled. Pillars of 75' and even up to 150' width, left on either side of every conglomerate shaft, contain stamp rock equivalent to about 18% of the stoping ground available before the robbing of the pillars. The conglomerate mine is opened 6 to 8 years in advance of immediate requirements, and has upwards of 200 miles of shafts, drifts, crosscuts and winzes.

Between 25,000,000' and 30,000,000' of timber, board measure, is used in the mine annually, and to the end of 1910, fully 800,000,000' of timber had gone underground. Iron pillars are used extensively as supports, in crosscuts connecting the Red Jacket shaft with drifts on the bed, and in various incline shafts to support the hanging wall. Iron, mainly scrap material, such as worn out skip rails, cut to 10' lengths and placed above I-beams, is used for lagging, to some extent. The conglomerate bed in the lower workings is not up to its average value above, being wide, but low in copper contents, and it is evident, from the results secured by the deep

shafts in the district, that while the cupriferous stratified beds of Lake Superior may descend to tremendous depth, copper values decrease rapidly below 4,000'.

The conglomerate mine, which, until a few years ago, was the entire Calumet & Hecla, has a life, at the present rate of production, of between 10 and 15 years, followed by 5 to 10 years of scrambling, with greatly decreased output. The conglomerate is deteriorating rapidly in average copper contents with depth. The mine works normally 165 to 175 power drills on the conglomerate, and 115 to 125 drills on the amygdaloid, and at one time, 1907, worked 315 drills, the largest number ever in use in any mine.

The Calumet & Hecla has suffered severely from underground fires. The rock carrying native metal cannot burn, like sulphide ore, but the old timbering eventually becomes nearly as inflammable as tinder. The really serious mine fires, 5 in number, occurred in 1884, July and Nov., 1887, Nov. 30, 1888, and May 27, 1900. All possible precautions are taken against mine fires, these including the partial fire-proofing of all mine timber with zinc chloride solution, regular sprinkling of all shafts, the maintenance of water pipes and hydrants, fire hose, chemical engines, an electric alarm system and 18 telephones at various pump stations, from the 8th to the 51st levels, inclusive, in 5 different shafts, so distributed as to be most readily accessible from all parts of the mines. From the first 4 fires the Calumet & Hecla suffered aggregate losses of several millions of dollars, while a number of lives were lost, and 3 valuable shafts were drawn so badly that they were abandoned. The fifth and last fire, in May, 1900, severely tested the mine's fire system, the fire breaking out on Sunday evening, when the mine was deserted by all but a few employees, and gaining great headway before it was discovered. The burning portion of the mine was shut off by closing the fire doors, and the mine was sealed at surface, by covering the mouths of the shafts with heavy timbers, with dirt tamped tightly into the crevices between. Wherever gas escaped through holes in the earth, dirt was tamped in and luted with water. The fire was extinguished in 3 weeks, and the South Hecla portion of the mine continued working without interruption. The 5 serious fires, and sundry smaller blazes, nipped in their inception, all have been of mysterious origin, and there seem reasons for suspecting incendiarism. Great precautions are taken to prevent unauthorized persons entering the mine, and permission to go underground is given only by the president, in writing, each pass being for a single trip.

The conglomerate property of the Calumet & Hecla is worked as 2 separate mines, known as the Hecla and Calumet branches, the South Hecla being a southerly continuation of the Hecla branch, and the Red Jacket vertical shaft a part of the Calumet mine. The Calumet to the north, the Hecla in the center, and the South Hecla at the south, form one continuous mine, developing the Calumet conglomerate by incline shafts, the Red Jacket shaft opening the same bed vertically. The conglomerate, opened for 2 miles along the outcrop, has 11 shafts, 8 being known as single compartments, which means a single hoisting compartment, with 2 shafts having 2 hoisting compartments and 1 vertical shaft having 6 compartments. Six shafts have auxiliary electric hoists, and the mine has electric station pumps for forcing water to surface with steam pumps actuated by compressed air for short lifts, but it is planned replacing these latter by electric pumps also.

The conglomerate shafts on the outcrop are as follows, from north to south: Nos. 6 and 5 Calumet have 2 compartments, each, both bottomed at the 60th level, 6,155' from surface. There is a considerable stretch of lean ground from No. 6 shaft to the Centennial boundary.

No. 4 Calumet, with 1 hoisting compartment, has a vertical depth of 4,748' and an actual depth of 7,995' on the incline of 37° 30', with a 200' winze from the bottom, giving a total depth of 8,290' from the collar of the shaft to the bottom of the winze. No. 3 Calumet shaft has been abandoned.

No. 2 Calumet shaft, with 1 compartment, is 6,186' deep, practically at the boundary, and it is to be robbed in the near future.

No. 1 Calumet shaft and No. 1 Hecla shaft have been abandoned.

No. 2 Hecla shaft, 4,400' deep, and No. 3 Hecla shaft, 4,000' deep, are bottomed at the Tamarack boundary. Stopes are exhausted and the mine being robbed by removal of shaft-pillars.

No. 4 Hecla shaft has been abandoned for some years. No. 6 Hecla shaft, with 1 compartment, is 7,791' deep, in good ground, and can be sunk to 8,500' depth. Nos. 7 and 8 Hecla, a double shaft of 1 compartment each, are 7,854' and 6,102' deep, respectively, in good ground, and can be sunk to about 9,000' depth.

Nos. 9 and 10 Hecla, a double shaft with 2 compartments, is 7,740' deep and can be sunk to 8,100' depth. The 73d level has shown a marked improvement.

No. 11 Hecla, 2,400' deep, showed very poor ground at the bottom, and gutting was begun several years ago, robbing all pillars from the bottom up.

No. 12 Hecla shaft, at the company's southern line, is 6,700' deep, bottomed in poor ground, and partly gutted, disclosing a formation entirely barren of copper at depth. This shaft is practically abandoned.

The Red Jacket vertical shaft, of 1,800 tons daily capacity, permanently bottomed at 4,920' depth, cuts the bed at 3,287'. Rock temperature was 87° F., reduced to about 70° by connection with No. 4 Calumet shaft, exhaust air from the power drills aiding in cooling the mine. The Red Jacket was planned to open a mine unconnected with the older shafts, to give reserve stopes in case of fire, but owing to heat and danger, connection was made with the older workings. The Red Jacket shaft is 14' 6" x 24' 6" within timbers, and is built of brick and cement from collar to the solid rock, and timbered below with Georgia pine. There are 6 compartments, 2 used for hoisting, 2 for water, and 2 for men and supplies. The 2 hoisting compartments, at the eastern end, have cages with 9-ton Kimberly self-dumping skips swung under. The 2 western compartments have double-deck cages for men and material, and the 2 middle compartments have large cylindrical steel bailers, for raising water. Timber for the Red Jacket shaft is lowered through No. 5 Calumet, with which the Red Jacket is connected by a cross-cut. The Red Jacket shaft hoists rock from all of the northern shafts below the 56th level, at which point the conglomerate is intersected. There are 9-ton steel storage bins at the various productive levels, which aid in maintaining the uninterrupted hoisting service that is absolutely essential in a shaft of a mile depth. A ventilating chimney at the collar of the shaft does away with ice formerly caused in winter by vapors arising from the shaft. The shaft rock house of the Red Jacket is 100x100' on the ground, and 110' high, with 6 crushers, 1 for poor rock.

The "Five Forties" is a tract of 200 acres, a quarter-mile wide and 1¼ miles long, lying between the Tamarack and Tamarack Junior mines, carrying the underlay of the conglomerate at great depth, and, to obviate sinking a deep and costly vertical shaft, this tract is opened by a blind shaft 1,588' deep, starting 1,500' east of the Red Jacket vertical, and near the bottom of Calumet No. 4 shaft, which abuts on the Tamarack boundary line at a depth of 8,100'. The blind shaft is sunk 25' under the footwall, at the same angle as the dip of the conglomerate, thus assuring solidity of walls while saving long and expensive crosscuts to the bed on each level. A

footwall lateral on the 57th level parallels the regular drift, at a distance of 25' in the footwall, between the Red Jacket vertical shaft and the blind shaft, offering an avenue for operation that obviates the confusion certain to result were the regular mine drifts given double duty. The blind shaft starts in the footwall drift, under and parallel with the 57th level, and eventually will be about 1 mile in depth, opening 4 of the five 40-acre tracts, leaving the 5th and last to be opened by a sub-shaft from the blind shaft, which doubtless will be sunk on the same system. The necessity for this peculiar method of development arose from the fact that the boundary lines of the property run north and south, while the strike of the bed is N. 39° E., giving a plane of dip of N. 51° W. Owing to the incline shafts being sunk on the dip of the bed, while the blind shaft must follow the section lines, the latter descends diagonally on the dip of the bed, giving the blind shaft an average dip of about 22° only, although the bed dips at 37° 30'. This unusually flat incline permits the hoisting of rock in tram cars, by an electric hoist on the 57th level, cars being hauled through the blind drift and dumped into the steel bins of the Red Jacket shaft for hoisting, thus saving a transfer at the mouth of the blind shaft. The workings of the "Five Forties" show the conglomerate bed to average about 14', with about 10' carrying stamp rock, the bed as a whole being very lean at this great depth. The abandoned workings of the Tamarack Junior mine of the Osceola Consolidated, which adjoins the "Five Forties," are drained by holes bored by diamond drill from the blind shaft.

A drainage drift is being driven, at depth of about 5,000', measured on the incline, 250' from the conglomerate, with a length of 2 miles, extending from No. 12 South Hecla shaft, the extreme southern end of the mine, to No. 4 Calumet, the most northerly shaft but one. This drift will drain water to No. 4 shaft, from which it will be lifted to surface by centrifugal electric pumps.

The Amygdaloid mine of the Calumet & Hecla is opened on the Osceola amygdaloidal bed, which outcrops 730' east of the Calumet conglomerate, with parallel strike and average dip of about 40°, underlying the entire main tract of the Calumet & Hecla mine. There are 6 shafts in the Amygdaloid mine, Nos. 13 to 18 inclusive, numbered from south to north. Shafts are duplicates in size, each having 3 compartments, of which 2 are used for hoisting and 1 for pipes and ladderways. The Amygdaloid mine has nearly 35 miles of workings and has frequent connections with the conglomerate by crosscuts. The Amygdaloid mine was closed 1901, and reopened 1904. In this mine the Osceola bed runs about 35' in width, with principal values along the foot and hanging, the middle third being lean, as a rule. Laterals in the Osceola workings are carried as drift stopes of 12' height along the hanging wall. The Calumet & Hecla owns, on its main tract, about 11,000' of the strike of the Osceola bed. Developed ore reserves of the Amygdaloid mine were estimated, April, 1909, at about 15,000,000 tons, and the Osceola bed has been found to carry fair copper values, at a vertical depth of nearly 1 mile, in the Tamarack property. Production from the Amygdaloid mine, for the year ending Dec. 31, 1912, was about 15,690,000 lbs. fine copper, from the Osceola rock averaging 15.08 lbs. copper per ton, produced from this bed at a cost of 10.36 cts. per lb.

No. 13 shaft, the southernmost on the Osceola bed, was 3,232' deep, Jan., 1913. No. 14 shaft, 3,200' north of No. 13, was 2,812' deep, Jan., 1913. No. 15 shaft, 2,600' north of No. 14, was 3,002' deep, Jan., 1913. No. 16 shaft, 1,800' north of No. 15, 3,036' deep, is the principal productive shaft of the Amygdaloid mine. No. 17 shaft, 1,800' north of No. 16, was 1,811' deep, Jan.,

1913. No. 18 shaft, the northernmost of the Amygdaloid mine, started 1907, was 1,460' deep, Jan., 1913, giving a good showing of stamp rock.

The Kearsarge amygdaloid bed outcrops about 2,200' east of the Osceola amygdaloid and 2,900' east of the Calumet conglomerate, with parallel strike and dip of about 41°, underlying the entire main tract. Work of development was begun Aug., 1903, and there are 3 shafts, numbered from north to south, each having 3 compartments and being practically duplicates of those on the Osceola amygdaloid. The shafts are "timbered" with steel, brick and concrete, the hanging wall being lined with 3 arches of brick, laid in 3 to 5 courses, thickness being increased with depth, supported by 2 rows of I-beams, which serve also as dividers for the shaft. The Kearsarge bed, as opened by these shafts, is erratic, though showing stretches of ground that probably will yield 18 to 22 lbs. fine copper per ton, with reasonable selection.

No. 19 shaft, about 1,000' south of the Centennial boundary line, is 1,300' deep, and furnished some stamp rock to the mill, but was closed down Oct., 1907. No. 20 shaft, next south of No. 19, is about 1,300' in depth, and idle also.

No. 21, the southernmost shaft on the Kearsarge bed, is 8,000' south of No. 20, and, at shallow depth, showed well in copper, but deeper workings were not so promising, the rock yielding only about 12 lbs. of copper per ton of rock mined. The shaft was 2,291' deep, Jan., 1913.

The Calumet amygdaloid, lying between the conglomerate and the Osceola amygdaloid, has been little opened, but might prove payable, as it shows some good ground in a crosscut on the 900' level.

The shaft rock houses at the conglomerate incline shafts, of uniform pattern, accommodate 40-ton railroad cars. The old 5-ton skips were replaced, 1907, by 7½-ton skips. Rock is hoisted to the top of each shaft rock house, passing thence over grizzlies that allow the finer rock to fall through, the larger masses being reduced in 24x36" crushers, going thence to 18x24" crushers on the floor beneath. Crushed rock falls by gravity into storage bins, whence it is dumped into cars that take it to the mills, railroad tracks running underneath each rock house. The standard equipment includes a 50-h. p. induction motor at each shaft, for driving crushers.

The surface equipment at the Calumet & Hecla is the most complete found at any mine in the world. With few exceptions everything is duplicated, to prevent possible delay or suspension, by reason of fire or accident.

The power plants at the main mine, on the Calumet conglomerate, include 4 large boiler plants and 6 hoisting plants. The hoists of the conglomerate mine are very powerful, ranging in capacity from 1,000 to 8,000-h. p. each. Miners are carried to and from work, in the incline shafts, by man cars, these being long trucks having tiers of circus seats, replacing skips when needed, being shifted quickly on or off the skip tracks by large cranes. This method has proven the safest, quickest and cheapest for moving men in and out of deep incline shafts.

At No. 4 Calumet shaft there is a group of the most powerful mining machinery in existence. The 62x146' brick engine house contains the 4,700-h. p. Corliss engine "Superior," with 40" cylinders and 72" stroke; the auxiliary engines "Baraga" and "Rockland," of 2,000-h. p. and 600-h. p. respectively; 2 Rand air compressors, of 25 and 40-drill capacity, and the engine "Mackinac," a 7,000-h. p. quadruple-cylinder triple-expansion steel giant, operating 4 Nordberg air compressors with a combined capacity of 650 drills, or about double the requirements of the mine. There also are four 35-drill auxiliary compressors. In the old Leavitt compressor, water was injected into the compression cylinders, while the Nordberg machines de-

liver the compressed and greatly heated air to a cylindrical steel cooler, 12' in diameter and 30' high, into which water is sprayed from above and drawn off at the bottom, this cooling the air to 80° F. The hoist has 4 drums, each 8' 6" wide and 20' 6" in diameter, serving 4 different shafts, 2 of these drums carrying nearly 2 miles of steel cable each. Power is supplied by batteries of boilers in 2 boiler houses adjoining, these having a brick chimney 250' high, with inside diameter of 12' 6". Locomotives haul the coal into the boiler houses, where it is fed to the grates by automatic stokers.

The 47x80' Hecla engine house, of brick, flanked by a large boiler house, contains the 2,000-h. p. compound hoisting engine "Frontenac" and 2 auxiliary engines, of 600 and 900 h. p., also a 30-drill Rand air compressor and a pair of water-plunger air compressors, with combined capacity of 144 drills, being the largest machines of this type ever constructed.

South of the Hecla plant is the "G. H. & S." engine house, having the "Houghton" and "Seneca" engines, of 2,000-h. p. each. The Hecla boiler house has 5 large boilers and a 200' smokestack, of 9' 6" internal diameter.

The engine house operating Hecla shafts Nos. 7 and 8 contains the engines "Hancock" and "Pewabic," each of 2,000-h. p., which operate 25' drums by spur gearing, and a 5,000-h. p. Leavitt engine for man cars. A 50x120' boiler house has 19 boilers and a 250' smokestack of 12' 6" internal diameter.

The South Hecla engine house at shafts Nos. 9 and 10 contains the engines "Detroit" and "Onota," of 1,000-h. p. each. The South Hecla engine house at shafts Nos. 11 and 12 has two 1,000-h. p. Lidgerwood hoists.

The Red Jacket shaft has an 8,000-h. p. quadruple hoist, housed in a 70x220' brownstone building, and in an adjoining brownstone building, 70x150', with a 250' smokestack of 12' 6" inside diameter, are ten 1,000-h. p. boilers. At the rear of the engine house is a 32x412' brownstone annex, floored with cement and roofed with slate, in which is carried the fleet gear. In raising 10-ton loads perpendicularly from a depth of 1 mile, the weight of the cage and steel cable nearly equals that of the cargo of rock, but with the aid of counterbalance the engines can hoist 10-ton loads at a speed of 40 miles per hour, the regular hoisting time being about 90 seconds for the vertical distance of nearly a mile, including time taken for starting and stopping, an achievement no locomotive could duplicate on a horizontal plane. The engine operates on a system devised by S. B. Whiting, formerly manager of the company. To overcome the dangerous strain caused by unequal wearing, Walker differential rings are placed on the sheaves, the cables taking 4 complete turns around the driving sheaves.

Equipment at the Amygdaloid shafts on the Osceola bed is practically the same at shafts 13, 14, 15, 16 and 17, the new shaft, No. 18, having a combined engine and boiler house, with a small Lidgerwood hoist. Shafts 13, 14 and 15 have large stone engine houses, with a steel engine house at No. 16. Shafts 13 to 17, inclusive, have Nordberg first-motion double conical-drum hoists, operating 10-ton skips in balance, good for 5,000' depth each. No. 15 engine house has an electric air compressor, used as a "booster," bringing the pressure up to 85 lbs. All engine houses have air connections with the main compressor plants at the old mine, and shafts 13, 14, 15, 16 and 17 have permanent shaft rock houses of the same general design as at the conglomerate workings.

The 225x250' machine shop has an equipment excelled by only a few of the largest shops in the country, including a 25-ton electric traveling crane and mammoth planers, with electric power throughout. These shops are capable of handling anything and everything in the line of repair work, and also have complete manufacturing facilities for the making of mining,

milling and smelting machinery, and have turned out hundreds of Wilfley tables, and other special machinery, under agreement with the owners of the patents.

The 78x96' foundry has 2 iron cupolas, and a brass foundry, with a 20-ton electric traveling crane. The pattern shop, of brick and steel, just north of the foundry, has 2 departments, one for the shop proper and one for storing patterns.

The carpenter shops are of great size, and are equipped with as complete a line of labor-saving machinery as can be found in any general wood-working establishment.

The blacksmith shops are of larger size than may be found elsewhere, except in the works of a few of the very largest manufacturers of machinery, and are equipped with steam hammers, forges, blowers, emery wheels, etc. The Calumet smithy alone sharpens upwards of 50 tons of steel drills daily, requiring the services of a small regiment of drill boys between the shops and mines. The Hecla blacksmith shop does general blacksmithing and forging for the entire mine, a stone addition of 66x152' having been built to the Hecla shop in 1903. The various shops of the Calumet & Hecla employ upwards of 100 blacksmiths.

A timber mill at the mine mortises and tenons the bed pieces, legs and stulls of the square sets that are used underground, and furnishes blocks and wedges.

The electric building at the mine is 74x74', of stone, housing the old electric power and lighting plant, but the main electric plant now is at the mills, in Lake Linden.

Warehouses include a very large brick building for general supplies, and special warehouses for steel and iron, oil, paint, etc., the main buildings having direct rail connections. There also are barns and a considerable number of miscellaneous structures, required in connection with the operation of the mine.

The office building is a large and handsome stone structure, housing the various executive departments and the engineering force of the mine. The company's private telephone system has an exchange with about 150 instruments, including a number of deep underground stations, with local and long-distance connections.

The company maintains a large hotel and a fine stone clubhouse for employees, the latter having bath rooms, bowling alleys, etc. The changing houses for the miners, at the various shafts, are well equipped with hot and cold running water, bath tubs and lockers.

The Calumet & Hecla public library, having 35,533 volumes on Sept. 30, 1911, ranks third in point of circulation in the state of Michigan, with an attendance, 1911, of 26,420, not including visitors. In addition to books in English, there are works in German, French, Italian, Swedish, Danish, Austrian, Finnish and Croatian, with periodicals and newspapers in a score of languages, about 30 different nationalities being represented on the company's payroll. There also is a combination branch library and club house at Lake Linden, for employees of the stamp mill and smelters.

The company maintains a hospital, for employees solely, with complete surgical and laboratory apparatus. Nearly a dozen physicians on the hospital staff are at the call of employees and their families.

The company owns about 1,200 dwellings, furnished to employees at an average rental of 6% on actual cost, plus cost of maintenance, and upwards of 1,200 dwellings are owned by employees on lands leased from the company at low yearly rentals.

There are 8 school houses on the lands of the Calumet & Hecla, most

of which were built by the company, including a fine manual training school, and a truly magnificent high school building at Calumet.

On Calumet & Hecla lands there are upwards of 30 churches, of a dozen different denominations. All of these sites were donated by the company, and in most cases substantial aid has been given in their erection and maintenance, entirely regardless of creed.

The company maintains 3 distinct systems of waterworks, one at the mines in Calumet, one at the mills in Lake Linden, and one on the shore of Lake Superior, 4 miles northwest of Calumet. The Lake Superior plant pumps water for domestic uses at Calumet against a head of 600', with an electric centrifugal pump of 3,000,000 gals. daily capacity. This plant also furnishes water to the mill and smelter boilers, on Torch lake. At the Calumet dam and mine there are 7 pumps, having a combined daily capacity of upwards of 45,000,000 gals.

The company maintains a complete fire department, modeled on metropolitan lines, affording protection to the mine buildings and location, and responding to calls from Red Jacket, Laurium and the other towns that go to make up the mining camp of Calumet, with 40,000 population, that has grown up around this great property.

The Hecla & Torch Lake railroad, owned by the company, connects the mines, mills, smelter and shops by upwards of 20 miles of main tracks, spurs and sidings, reaching every shaft, shop, warehouse, mill and furnace. The 5-ton wooden rock cars formerly used were replaced, 1908, by 150 forty-ton steel rock cars, and the line widened to standard gauge, by the addition of a third rail. Three new locomotives were bought, and the old narrow-gauge locomotives rebuilt to standard gauge, in the company's shops.

The stamp mills are at Lake Linden, 4 miles from the mine, on a tract of 998 acres, having several miles of frontage on Torch lake. There are 2 mills, known as the Hecla and Calumet, each originally having 11 Leavitt steam stamps with 14x21½" cylinders and 24" stroke. A 165x308" steel addition to the Hecla mill, with 6 stamps, was built in 1903, and, upon its completion, the rebuilding of the 2 old mills was begun, each being divided into 2 sections, with 1 section rebuilt at a time, each section requiring approximately 1 year for completion, remodeling being completed in 1907. Great as was the cost of this work, the new mills practically had paid for themselves upon completion, through reduced cost of operation and increased saving of copper. While the mills are termed rebuilt, they actually are entirely new mills, standing upon the old sites, practically nothing of the old material having been utilized. The new mills handle rock with about 60% of the wash water formerly required, effecting a double saving, inasmuch as all water used in the mills first must be pumped in, and thereafter raised as sludge, by the sand wheels, for discharging.

The new mills, built by the Wisconsin Bridge & Iron Co., have heavy steel frames, with concrete foundations, cement floors, corrugated iron siding and Carey roofs of tarred burlap. Foundations are much heavier than those in the old mills, and the wash room below the heads is much greater. Foundations are of very massive piles, spaced 20" apart, with 2 and 3 tiers driven to bed-rock, and topped with 6x12" square timber, capped by a 4' 6" bed of concrete. The mills have 29 Leavitt heads and 1 Nordberg steeple-compound head, of which 28 heads are in commission regularly, with 2 in reserve, 20 heads treating conglomerate rock and 6 crushing amygdaloid rock. Stamps are actuated by steam power, except the 6 stamps in the Hecla addition, which have independent 25-h. p. motors each, but the other milling machinery is operated electrically. The Leavitt heads have a daily

capacity of about 400 tons of conglomerate, 500 tons of Osceola amygdaloid or 550 tons of Kearsarge amygdaloid.

The mill equipment below the stamps, includes Woodbury-Benedict jigs; ten 4-deck Evans-Rawlings round tables, from which slimes are treated by 96 Wilfley tables; Chilean regrinding mills and Averly grinders and classifiers. The 220 Wilfleys effect a considerable saving of the very fine copper formerly lost, and greatly reduce the water consumption.

As the mills stand on the flat western shore of Torch lake, but little above water level, tailings speedily filled the shallow lake for some distance off shore, and to waste the sand it became necessary to secure a considerable initial elevation, which is gained by sand wheels. The material entering the mills as conglomerate rock leaves as coarse sand to the extent of fully 8,000 tons daily. The sludge is washed through launders to the sand houses, where it is scooped up by the buckets of the wheels and dumped, high above, into launders running on trestles far out into the lake, these spouting forth miniature brick-red Niagaras. There are two wheel houses, one for each mill. The Calumet wheel house has sand wheels of 40' and 50' diameter, and the Hecla wheel house, caring for the sands from a much larger mill, has sand wheels of 40' and 64' diameter, the latter being housed in a 3-story steel annex, 65x78' on the ground and 94' high. The old wheel houses are of wood, iron sheathed. The steel in the annex to the Hecla wheel house weighs 490 tons, and the building is equipped with a 45-ton Sellers traveling crane. The sand wheel is to all appearances a gigantic bicycle wheel, fitted with spur gearing where the rubber tire should be. The complete wheel weighs 500 tons, and is mounted upon massive concrete masonry. Four 25-ton iron bed plates support the pillars carrying the 21-ton Krupp forged steel axle, which is 27' long and 32" in diameter with a hollow core of 26" diameter. Radiating from axle to rim are 2" steel spokes 32' long. The rim is in 20 segments, weighing 10,700 lbs. each, the inner perimeter of the wheel having 550 buckets, in pairs, each 3' wide and 4' 6" long, and holding 100 gals., giving the wheel a capacity of 55,000 gals. per revolution. The completed wheel is 10' wide and 64' in diameter, driven by gear and pinion, power being furnished by a 700-h. p. dynamo. Nearly 2 years were required to build and adjust this monstrous wheel.

The No. 1 regrinding plant, built 1908-09, and in full commission Jan., 1910, occupies a 195x340' building. The frame is of structural steel, resting on concrete foundations, the floor being of stamp sand, with a concrete capping, no particle of wood entering into the construction of the building. Power is furnished by eight 250-h. p. induction motors, giving about 100% excess capacity, to provide against delays through overhauling and repairing. The plant has cost about \$400,000. Equipment, built almost exclusively in the shops and foundries of the company, consists of 48 Chilean mills, resting on concrete piers, in 2 parallel rows, each pier being a hollow octagon 6' high and 7' in diameter, with a 10" wall, the hollow being filled to a height of 10' with stamp sand, capped by 4' of concrete. All piers are joined by concrete ribs, in which a heavy steel cable is embedded, passing through each pier connection. There are 200 Wilfley tables, each section of the plant having 1 grinder, 18 tables for roughings, 4 tables for middlings, and 12 tables for slimes. Product from each set of 2 grinders goes to a settling tank, from whence the roughings go to the first 3 tables, and the slimes to 2 other tables, the middlings from each 15 tables going to 2 additional tables. The coarse sands from the Calumet mill go to sand wheel No. 2, and waste sands to wheel No. 1, the coarse sand elevated by wheel No. 2 running to the regrinding plant, where the amount going to each mill is regulated by feed gates, an overflow tank at the end of the launder caring

for the surplus, in case of stoppage of the mill. A 65-ton Hardinge conical tube mill, crushing coarse tailings, is 8' in diameter at the larger end, tapering to 11" at the discharge end, the pulverizing of sands being accomplished by the use of Danish pebbles on a lining of hard brick.

The regrinding mill has traveling cranes, and every piece of machinery is duplicated, so that breakages can be repaired quickly. The mill is fed with tailings from the stamps treating the richer rock in the Calumet mill, sands carrying up to 12 lbs. copper per ton. No slimes go to the regrinding plant, which treats exclusively coarse gravel and sand from the jigs and tables. The product is clean mineral, of good average tenor, which is pumped into bins, and thence loaded into cars for shipment to the smelter. Labor costs are very low, the plant being automatic throughout, and the force is only 12 men and boys per shift.

The management figures on a 50% extraction of copper values from the tailings reground, at a cost of about 4.75 cts. per lb., on a basis of about 2,000,000 lbs. yearly production, and, 1912, was said to be recovering about 5 lbs. of copper per ton, at a cost of about 5 cts. per lb. for copper in the form of mineral, equal to about 6 cts. per pound for finished copper, laid down on the seaboard. Production, to end of 1912, from the tailings plant, was 7,375,438 lbs. fine copper. The regrinding plant apparently has proven its ability to treat fresh tailings at a substantial profit, but there is some question whether the older tailings in the lake have not oxidized to a point where extraction will be more difficult, though, to offset this, the older tailings are the richer in copper. The tailings at the Lake Linden mills are the most extensive in the world, containing about 40,000,000 tons of stamp sand, carrying an average of 8 to 10 lbs. of copper per ton in the newer sands, and 12 to 20 lbs. in the older sands, these tailings carrying about 500,000,000 lbs. of copper—an amount greater than the total production of any but the largest copper mines of the world.

The No. 2 regrinding plant, begun 1912, is practically a duplicate of No. 1. The building is 123x432' on the ground. This mill, equipped with 64 Hardinge conical mills instead of Chilean mills, as is No. 1, is expected to be in full commission early 1914.

Water for the mills is supplied by 4 pumps, of which the "Michigan" is the most powerful in the world, having a daily capacity of 60,000,000 gals. Auxiliary pumps are the "Huron" and "Ontario," of 20,000,000 gals. capacity each, the "Erie" of 10,000,000 gals., and an I. P. Morris pump of 22,000,000 gals. daily capacity.

The electrification of the Calumet & Hecla was begun in 1904, and eventually will be completed, at mines, mills and smelters, except for some of the big compounded hoists and air compressors at the mine, where a change from steam to electricity would be doubtful economy, as well as necessitating enormous initial outlays. Electricity now actuates the crushers in the rock houses, the shops, many of the underground pumps, the Lake Superior pumping station, some of the stamps, and the milling machinery below the stamps.

The central power station, of steel, with 12,000-h. p. capacity, is located at the mills rather than at the mine, because fuel can be delivered alongside from the largest vessels plying the great lakes, effecting a saving of about 10 cts. per ton on transportation cost of coal formerly burned at the mines, with a much greater saving in the case of isolated plants lacking rail connections, and there also is a saving in slack, resulting from one less handling of the coal. Some of the former steam installations consumed as much as 4 lbs. of coal per h. p.-hour, while the new electric plant requires approximately 1½ lbs. per h. p.-hour. There are numerous other economies result-

ing from a central electric power plant, especially in labor, the company formerly employing 100 firemen in its various power plants, the coal consumption of the Calumet & Hecla, at its mines, mills and smelters, being about 250,000 tons yearly. Machinery at the power plant includes the old engines "Saginaw" and "Gratiot," the former an Allis-Chalmers twin vertical tandem compound-expansion engine having 17x40x48" cylinders, each engine being direct connected to a 1,000-kw. alternating current generator, and the Leavitt engines "Owego" and "Ontonagon," of 3,000-h. p. each, built originally for hoisting purposes, direct-connected to 2,000-kw. generators. The electric equipment of the mills include 15 motors, of 20 to 250 h. p. each.

The 108x220' boiler house, of steel frame, with two 200' self-supporting brick-lined steel smokestacks, has twenty 500-h. p. Babcock-Willcox tubular boilers. There are coal crushers, feeding an endless link-belt system with 308 steel link buckets, of 60 tons hourly capacity, taking coal to overhead bins, whence it is fed to the grates by Roney automatic stokers. Water requirements at the boiler plant are about 750,000 gals. daily, and water formerly was secured from a reservoir, artesian wells and Torch lake, going through a Jewell filtration plant of 500,000 gals. daily capacity, in which impurities were precipitated by lime, but the new plant takes water from a 750,000-gal. reservoir, fed from Lake Superior via the Calumet pipe line.

Miscellaneous buildings at the mill site include a 50x100' steel frame smithy, 48x175' warehouse, machine shop, carpenter shop, paint shop and sundry other shops and warehouses required in connection with the works.

The Torch Lake smelter is at Hubbell, about a mile south of the mills, on a 30-acre site having ample frontage on Torch lake, with deep water in front and 3 railways at the rear. The smelter has 4 brick furnace buildings, each 80x130', and a 50x70' blister copper furnace building, both blast furnaces and reverberatories having been rebuilt within the past few years. There are 11 reverberatories, which are top-charged, having platforms above on which the mineral is thoroughly dried before charging. The reverberatories have 93' stacks. The largest blast furnace is 40x96" at the tuyeres, its comparatively small size being due to the use of reverberatory furnaces for the bulk of the smelting work required in the process of reducing the native copper mineral treated. A new steel-frame smelter building, built 1911-12, houses two 150-ton reverberatory furnaces, of the so-called Jumbo pattern, modeled after the furnaces of the Lake Superior Smelting & Refining Co. The practice of the smelting plant is fully abreast of the times, in all essentials.

The electrolytic plant, 155x270', partially completed, 1913, will supersede the Buffalo reduction plant, which is to be abandoned, and is fully described Vol. X.

There are 3 concentrate or mineral houses, with a combined storage capacity of 18,000 tons, at Hubbell. Calumet & Hecla concentrate, locally called mineral, now carries less than 60% copper, being dressed much lower than formerly, to effect the saving of the very fine copper previously lost in the slimes.

The power plant at the smelter has three 125-h. p. boilers, and a fourth boiler, in the cupola building, generates steam by the combustion of waste gases from the reverberatory furnaces. A small electric plant has an 85-kw. generator, with a 25-kw. generator in reserve.

The smelting works have a 2-story assay office and laboratory, 40x42' with a 14x14' wing, exceptionally well arranged and complete in equipment. There also is an office and a large warehouse for supplies.

The dock system of the Calumet & Hecla is extensive, including a series of very large coal sheds at Lake Linden, 1 of 200,000 tons capacity, the

old sheds being of wood and the new of steel. There is a series of docks at the mills and smelters on Torch lake, all with substantial wharves having at least 21' of clear water alongside, frequent dredging being required to maintain this depth of clear water, owing to stamp sand filling in. The 750' coal wharf has 11 Hunt hoists, and three 52' movable derricks, 1 of wood and 2 of iron.

The Calumet & Hecla owns and operates the ship canal connecting Torch lake with the government waterways on Portage lake, this canal being 21' deep and accommodating the largest vessels plying the great lakes. Tolls, ranging from 10 cts. on soft coal to 50 cts. per ton on package freight, are charged by the company, on independent cargoes entering Torch lake through this canal.

A saw mill, at the head of Torch lake, receives logs by rafts, and ships sawed lumber and timber by a branch of the Hecla & Torch Lake railway. The company owns extensive tracts of pine, hemlock and hardwood timber along the southern shore of Lake Superior, this land carrying between 400,000,000' and 500,000,000' of standing timber. The company also has a long-term timber contract with the Keweenaw Association, Ltd., and buys extensively of jobbers, the requirements for underground timbering alone being 25,000,000 to 30,000,000' annually, in addition to the many million feet of timber and lumber used on surface at the mines, mills and smelters.

An aid fund for employees, instituted 1877, and managed by directors chosen by the workmen, pays sick benefits, enormous sums having been disbursed since the formation of the fund. Surplus monies accumulated in the aid fund have been invested in the company's shares, bought on the open market. Death and disabilities caused in the line of duty are cared for under the provisions of the Employers' Liability and Workmen's Compensation act, passed by the Michigan legislature, 1912.

The company markets its own copper, and for many years this branch of the business was looked after by Col. T. L. Livermore, who resigned as vice-president, at the close of 1910, after 4 decades of honest and efficient work, with the hearty good will and respect of everyone in the copper trade.

Beginning with the new century, the policy of the Calumet & Hecla has been one of expansion. Almost from its birth it was the greatest copper producer of the world, and the most profitable mine of any metal. The company was progressive, leading all other mines in the introduction of heavy mining machinery and modern methods, but was self-contained and self-sufficient. It was seen, however, in 1901, that the old mine, great as it was, must come to an end sometime, hence a radical change in policy, which included the reconstruction of its mills, many changes in mining practice, and, most important of all, the acquisition of mineral resources outside of the old mine, in addition to the opening of a fine new mine on the Osceola amygdaloid, upon the old tract, and the tentative opening of a mine on the Kearsarge amygdaloid. In consequence of this policy of expansion, the Calumet & Hecla, instead of being the decadent property that it would be but for this, continues well at the front, in both production and earnings. Costs have been reduced largely, and savings effected in innumerable ways. The growth of the property, during the new century, has been well balanced, every department having been brought to a higher degree of efficiency. Operating costs have been largely reduced, without cutting wages, while charging millions of dollars for new equipment direct to operating expenses, and, despite the decreasing percentage of copper due to deepened mines, the cost of making a pound of copper was reduced, from almost 11 cts. in 1901, to the present cost of 8½ to 9 cts.

The conglomerate rock from the old Calumet & Hecla workings has shown a strongly declining tendency in values for many years past, and a rather alarming decline within the past few years. Net returns were almost 5%, or 100 lbs. of fine copper per ton in 1873; 4.75%, or 95 lbs. fine copper per ton, in 1880; 3.012%, or 60.24 lbs. per ton, in 1889; 59.93 lbs. in 1900; 52.44 lbs. in 1902; 39.68 lbs. in 1907; 35.96 lbs. in 1908; 33.14 lbs. in 1909; 30.12 lbs. in 1910; 30.38 lbs. in 1911, and 29.73 lbs. in 1912. Rock from the Osceola amygdaloid returned 18.45 lbs. per ton in 1907; 17.67 lbs. in 1908; 16.40 lbs. in 1909; 15.82 lbs. in 1910; 15.89 lbs. in 1911, and 15.08 lbs. in 1912. The average for all rock milled, during the calendar year 1912, was 24.18 lbs. fine copper per ton.

Detailed figures, by years, of both production and dividends, from the organization of the company, in 1871, may be found in the statistical chapter.

Production has shown a steady decline since 1906, in which year the high mark of 100,023,420 lbs. fine copper was reached, and in 1912, was only 67,856,429 lbs. copper. A further decline in the average yield of copper per ton of rock mined, and a growing scarcity of labor cut production to 29,786,127 lbs. in the first 6 months of 1913, and a labor strike, begun July 23, has so effected production that the output for the year will probably fall under 50,000,000 lbs. copper.

CALUMET & JEROME COPPER CO.

ARIZONA

Office and mine: Jerome, Yavapai Co., Ariz. G. W. Avery, pres. and gen. mgr.; Geo. H. Avery, sec.-treas.; preceding officers, J. W. Avery, Chas. F. Avery and Jos. Larson, directors. Organized May, 1907, under laws of Arizona, capitalization \$1,500,000, shares \$1 par; issued \$535,964. Lands, 3 claims, area 82 acres, one-half mile south of the United Verde mine, and adjoining the Cleopatra. Property is traversed by an immense dike, of 600' estimated width. Development consists of several tunnels, one of 115', a new main tunnel now 670' long and a shaft 100' deep, April, 1913, and planned to connect with main tunnel at depth of about 500'. Company is a local organization, and working but few men in Aug., 1913.

CALUMET & MASSEY COPPER CO.

ONTARIO

Office: 732 Granite Bldg., Rochester, N. Y. Mine office: Massey, Algonia, Ont. S. R. Snook, pres. and gen. mgr.; B. F. Freshwater, first vice-pres.; J. M. Briggs, second vice-pres.; Frank A. Beyer, third vice-pres.; M. S. Phelps, sec.; Samuel B. Williams, treas.; preceding officers, A. Miller, L. Bonneau, C. C. La Clare and E. E. Shutt, directors; E. A. Collins, gen. supt. Organized April 28, 1909, under laws of South Dakota, capitalization \$5,000,000, shares \$1 par, nonassessable; issued, \$1,889,000. Annual meeting, fourth Tuesday in April.

Lands, 22 claims, area 880 acres, and a 12-acre smelter site. Property shows quartzite and schist, having 4 fissure veins, of 6 to 9' estimated average width, traced $1\frac{1}{4}$ miles, carrying chalcopryrite, bornite and chalcocite, estimated by management to average 6% copper, with a trace of gold. Mine has about 2,000' of workings, estimated to give 50,000 tons blocked out for stopping, and company estimates a cost of 8 cts. per pound for finished copper. Idle. A report on the property was made for the company, Aug., 1910, by E. A. Collins, B. S.

CALUMET & MONTANA MINING CO.

MONTANA

Address: P. J. Driscoll, 120 West Granite St., Butte, Mont., trustee in bankruptcy. E. Olsen, sec., 518 Manhattan Bldg., Duluth, Minn. Company owned Parker group of claims midway between Elkhorn and Radersburg, Mont., and later acquired the King Solomon mine, $2\frac{1}{2}$ miles from Clancy station, Mont., on the Great Northern railroad. Company reorganized,

1913, as the Calumet & Montana Consolidated Co., on a basis of 10 for 1, with a 25-ct. assessment. Company has been persistently boomed with wild statements in the newspapers and the reorganization is regarded unfavorably.

CALUMET-NEW MEXICO MINING CO.

NEW MEXICO

Secretary's address: Philomen Pement, 5217 S. 44th Ave., Chicago, Ill. Mine office: Magdalena, Socorro Co., N. M. Alex. McCallum, pres.; Alpheus McCallum, vice-pres.-treas.; preceding officers, Jacob Ehrenberg and Jos. Vezzetti, directors. Organized under laws of New Mexico, capitalization \$1,000,000.

Lands, 12 claims, patented, area 240 acres, in Hop canyon, 2 miles from a railroad, and 5 miles from Magdalena, include the Slide Rock, Ethel and Sara claims, showing ore assaying up to 21.2% copper, 20 oz. silver and \$19.84 gold per ton, with occasional lead and zinc. Development is by tunnels with about 2,500' of openings.

CALUMET-SONORA MINING & MILLING CO.

MEXICO

Office: Sherwood Bldg., Duluth, Minn. Mine office: Aptdo. 265, La Mesa, Cananea, Sonora, Mex. R. P. Burgan, pres.; N. F. Hugo, vice-pres.; B. Silberstein, second vice-pres.; John A. Percival, sec.-treas.; Walter Harvey Weed, cons. engr.; preceding officers and D. T. Helm, directors.

Organized May 3, 1912, under laws of Arizona, capitalization \$2,500,000, shares \$10 par. Holds title to lands through a Mexican corporation, the Calumet & Sonora of Cananea Mining Co., S. A. Annual meeting, last Monday in May. Is a reorganization of the Calumet & Sonora Mining Co., purchasing the entire holdings of that company. Bonds authorized, \$100,000; issued, \$46,000.

Property, 631 acres, about 2½ miles northwest of Cananea, shows 17 fissure veins cutting diabase and the more recent volcanic tufts which form the foothills and table lands of the Cananea mountains. Many of these veins show at the outcrop, several of them widen into broad masses of leached, silicified ledge matter, resembling the outcrop of the Duluth Cananea and occurring where several fissures intersect. Three veins have been opened by underground workings.

The Chivera mine has thus far been the chief producer of the company. It has an inclined shaft, 525' deep, with levels at 60', 200', 300', 400' and 525', developing a well-defined fissure vein in indurated volcanic breccia, or tuff, of varying width that opens out into an orebody 300' long and 150' wide composed of large and small angular blocks of country rock cemented by argentiferous galena, chalcopyrite and sphalerite, with less abundant tetrahedrite, mixed with quartz. The orebody is in places a glittering mass of galena, but as a whole is a complex mixture of lead, copper and zinc sulphides, the mill feed carrying 4.7% lead, 0.4 to 0.8% copper and 9% zinc. The ore minerals disseminated through the mass of breccia above the 525' level, appear to be concentrating in a narrower ore shoot, 300' long and 50 to 60' wide on this level.

The mine is equipped with a new electric hoist, a 1,435-cu. ft. electric-driven Rand compressor, General Electric motors for all machinery and a 36x24" Farrell crusher with Robins conveying picking belt and ample storage bins. This equipment, installed 1913, is run by electric current supplied by the Cananea Consolidated Copper Co. at 2½ cts. per kw. hour.

Ore is sorted on the picking belt and hauled over a surface tram to the concentrating mill. Latter is an old mill brought from Missouri and altered for local conditions, but a makeshift at best. In this mill the silver-lead ore is taken out and the middlings containing zinc and copper are sent to the dry, or electrostatic mill. Tailings average 0.21% lead, 0.12% copper and

0.77% zinc. The dry mill contains Huff electrostatic separators, which separate the copper from the zinc. Concentration is 8.5 into 1, being 87.9% of the lead, 74.8% of the zinc and 70% of the copper in the ore; the lead concentrates carry 33 ozs. silver per ton, averaging 70% lead. Shipments of zinc concentrates in 1913 averaged 50% and the copper 17%.

In addition to the workings mentioned, there is the No. 2 Catalina shaft, 225' deep, vertical, with levels at 70', 110', 145' and 212', the workings exposing an oreshoot $2\frac{1}{2}$ to 6' wide and as much as 60' long, but cut by cross faults and not continuously minable. The ore shoot has been practically mined out to the 145' level, yielding about 1,800 tons of antimonial copper-lead ore carrying zinc. This ore is higher in value than that now milled. This No. 2 shaft is now dismantled and idle. The vein expands west of the mine into a large outcrop which is the most promising surface exposure seen on the company's property and warrants deep exploration.

Catalina No. 1 shaft, 120' vertical, is said to develop a vein of low-grade copper ore, 3 to 5' wide, opened by 220' of drifting. This shaft is now dismantled and filled with water.

The company has a large acreage, at least 2 very promising surface outcrops and a dozen or more fissure veins and should with proper development become a large producer of low-grade complex ores. The treatment problem has been solved; total mining and milling costs reduced to \$4.50 per ton and the property splendidly equipped for work. Company plans sinking the Chivera shaft and is expected to open up sufficient tonnage to place property on a profitable basis.

CALUMET & YAQUI RIVER COPPER CO.

MEXICO

Idle. Mine office: Soyopa, Ures, Sonora, Mex., H. C. Rolfe, pres.; Geo. H. Nolte, sec.; W. J. Elliott, treas., at last report. Organized April 28, 1903, under laws of Arizona, capitalization \$3,000,000, shares \$10 par. Apparently is successor Santa Marguerita Mining Co., and bought lands of the Venice Copper Co., 7 miles from Soyopa, area 85 hectares, opened by a 1,200' tunnel, showing copper sulphides of fair tenor at shallow depth. Was said to have a 50-ton smelter. Inactive several years and apparently moribund.

CALZONA MINES CO.

CALIFORNIA

Mine office: Calzona, San Bernardino Co., Cal. A. W. Martin, gen. mgr. Property, in the Riverside district, $1\frac{1}{2}$ miles west of the Colorado river, and about 60 miles southwest of Parker, Ariz., shows a contact vein between diorite and limestone carrying mainly gold values with some silver and copper. Development is by tunnels 320' and 600' long, and several shafts, deepest being 196', May, 1911.

CAMAS COPPER MINING & MILLING CO.

MONTANA

Idle. Property near Camas, Sanders Co., Mont. Fully described Vol. X.

CAMBRIA COPPER CO.

NEVADA

Mine office: Aurum, White Pine Co., Nev. Owen Pritchard, supt., at last accounts. Lands, 4 claims, known as the Texas group, at Muncey creek, Spring Valley, in the Silver Canyon district, 10 miles east of Melvin on the Nevada Northern R. R. and 30 miles north of Ely; also 10 miles of water right, on Muncey creek, and 580 acres of ranch lands. Claims show veins and replacement deposits in limestone. Has shipped carload lots of ore to Salt Lake smelter returning 22.55 to 23.4% copper. Property assessed at \$6,600 and advertised delinquent for taxes, July, 1913.

CAMBRIAN MINING & DEVELOPMENT CO., LTD.

ONTARIO

Office of mine: 5 Mooring Block, Port Arthur, Thunder Bay district, Ontario. C. H. Krause, pres. and mgr.; Lester Cain, vice-pres.; S. John Schulte, sec.-treas.; preceding officers, Edw. A. Grocheau and W. D. B.

Turville, directors; Capt. John King, supt. Organized Sept. 10, 1909, under laws of Ontario, capitalization \$1,000,000, shares \$1 par; issued, \$304,980. Company succeeded the Jasper Copper Co., Ltd., which was a bad egg. Annual meeting, first Tuesday in September.

Lands, 49 claims, area 1,960 acres, and a 40-acre mill site, on Sturgeon and Jean Pierre bays, on the Black Bay peninsula, 13 miles from Wolf River station, on the Canadian Pacific railway. Property, 40 miles east of Port Arthur, is on the northern fold of the Keweenaw syncline, and carries various amygdaloidal strata, with average dip of about 35° S. E. Development is by tunnels of 50' and 156', showing native copper disseminated in an amygdaloidal bed, formerly claimed to average 4 to 10%, but said by Mr. Krause to average 1.5 to 2% copper. Four Cyclone core drill holes, bored 1910, cut amygdaloidal beds carrying native copper. Buildings include log bunk houses. Frank L. Levy, the financial agent, sold stock in the worse than worthless Jasper Copper Co., Ltd., that this company succeeded, but Mr. Krause is considered competent and trustworthy.

CAMP VERA GROUP.

CALIFORNIA

Idle. Office: Barstow, Cal. W. J. Rodgers, owner. Lands, 31 claims, in the Morrow district, about 25 miles north of Barstow. Property shows a mineralized belt of iron-stone rock 50 to 500' wide, overlying a copper-bearing formation said to carry up to 18% copper and \$4 gold per ton. Development is by a 100' shaft and numerous shallow open cuts and pits, exposing considerable copper oxide in a vein 8" to 2' wide.

CAMPECHANA o POSITIVA y ANEXAS, S. A.;

NEGOCIACION MINERA LA.

MEXICO

Idle. Mine office: León, Guanajuato, Mex. Organized Jan. 12, 1907, under laws of Mexico, capitalization 300,000 pesos. Lands, 17 kilometers northeast of León, include the Campechana and Anexas mines. Property shows low-grade copper and lead ores, with fair silver values. Mine is said to have considerable ore blocked out, averaging 2 to 3% copper, 2 to 5% lead and about 10 oz. silver per ton. Equipment includes a 40-ton concentrator.

CAMPERDOWN GROUP.

WYOMING

Idle. Property, near Saratoga, Carbon Co., Wyo., on the southern slope of Coad mountain, said to have good showing of copper ore, somewhat resembling that of the adjoining Cumberland group.

CAMPO SECO COPPER CO.

CALIFORNIA

Mine office: Campo Seco, Calaveras Co., Cal. Organized April, 1910. Property is 5 claims, known as the Galligher group, near the Penn Mining Co., opened by tunnel, with considerable development and having some reserves of high-grade ore blocked out. Ore carries fair values in gold and silver. Idle and apparently moribund. No returns secured.

CAMPO SECO MINES.

CALIFORNIA

Owned by Penn Mining Co., at Campo Seco, Calaveras Co., Cal.

CANADA DEL ORO MINING & DEVELOPMENT CO. ARIZONA

Idle. Mine near Oracle, Pinal Co., Ariz. Eugene S. Dives, pres.; Maj. W. A. Desbrough, sec. and mgr.; Louisa M. Matoss, treas.; preceding officers, A. C. Waters and Uri Embody, directors, at last accounts. Organized 1906, capitalization \$1,000,000. Lands, 23 claims, in the Cañada del Oro district of the Santa Catalina mountains, showing well-defined orebodies, having 7 shafts and tunnels, with about 1,000' of openings, carrying ore said to give assays of \$51.75 to \$181 per ton, in lead, copper, silver and gold. Apparently moribund.

CANADIAN-AMERICAN EXPL. CO., LTD. BRITISH COLUMBIA

Idle. Office: Vancouver, B. C. Mine office: Van Anda, Texada

island, B. C. Stock is \$10 par. Lands, 3 claims, known as the White Swan group, held under bond and lease, near the Lucky Jim mine, on Valdez island, and claims adjoining the Marble Bay mine, on Texada island, latter having a 50' shaft, showing at and near surface mainly pyrrhotite, associated with pyrite, carrying a little chalcopyrite and mispickel, latter not especially auriferous. Favorable developments at 1,500' depth in the Marble Bay mine make the property attractive as a developing proposition.

CANADIAN COPPER CO.

ONTARIO

Office: 43 Exchange Place, New York. Mine and works at Copper Cliff, Algoma, Ont. John Lawson, pres.; J. L. Slaughter, vice-pres.; J. L. Ashley, sec.-treas.; preceding officers, A. Monell, Andrew Squire, F. S. Whitcomb and F. S. Jordan, directors; J. L. Agnew, gen. supt.; D. H. Browne, metallurgist; Wm. Hambly, supt. Creighton mine, H. C. Meek, supt. Crean Hill mine. Organized Jan. 6, 1886, under laws of Ohio, capitalization \$2,500,000, shares \$100 par, and is licensed in Canada by special act of Parliament. Controlled, through entire stock ownership, by International Nickel Co.

The Canadian Copper Co. is the owner of the world's largest nickel mine, and also is a copper producer of importance. Ore was discovered, 1882, and the first mine was opened in 1886. Lands are 17,000 acres freehold, and 600 acres leasehold, all in the district of Algoma, in the vicinity of Sudbury. Extensive diamond-drill borings have shown large reserves of ore.

The principal orebodies are irregular contact deposits in basic igneous rocks and granite, with norite gabbro penetrated by stringers and bunches of ore that is a mixture of nickeliferous and cupriferous pyrrhotite, with dioritic gangue, copper being in the form of chalcopyrite, and nickel occurring mainly as a partial replacement of the iron in chalcopyrite and pyrrhotite, with small quantities of pentlandite, which is the mineralogical equivalent of chalcopyrite with substitution of nickel for copper. Ores carry 1 to 4% copper and 2 to 6% nickel, with an average of 2 to 2.5% copper and 4 to 5% nickel. The company employs about 2,500 men.

The Creighton mine, employing about 400 men and producing 150 tons of ore daily, 1906, has 2 shafts, but extraction is mainly from an immense open pit, about 225' wide from foot to hanging, 520' long and 150' deep. The pit has 13 railroad tracks, converging to an entry on the footwall that leads to an incline shaft. Ore is broken in steps, and thrown to the bottom, where block-holed and trammed to the shaft. Drill borings prove the Creighton orebody to extend some distance west of the pit. No. 1 shaft is 320' deep, with 4th level at depth of 300'. A new shaft, No. 2, sunk in the granite, about 500' west of the old shaft, has 3 compartments, with walls concreted for about 40' depth from the collar, and is 390' deep, with 4th level at 370'. No. 2 shaft has a rock house 42x46' on the ground and 72' high, of reinforced concrete to the bin floor, above which the walls are of 3" planks, 10" wide, spiked together. The rock-house equipment includes two 18x30" Blake crushers and a picking belt 3' wide and 50' long.

The Creighton mine has an air compressor with piston efficiency of 1,635 cu. ft. of free air per minute, driven by a 300-h. p. 550-volt constant-speed induction motor. The Creighton mine is operated exclusively by electricity for hoisting, crushing and other work. No. 2 mine, which produced 200 tons daily, 1906, was idle at last accounts.

The Crean Hill mine, about 2 miles east of the Victoria, is opened by 2 shafts, No. 1, with 4 compartments, being 300' deep, sunk at an angle of 57°. Production is about 300 tons daily, with stoping on the 1st, 2nd, 4th and 5th levels. A dry-walling system is used underground, and

there are open-cast workings, operated summers only. Production is about 300 tons daily, with a force of 400 men. Extensive diamond-drill borings have shown a series of lenses from 50 to 80' in width, carrying a larger amount of pentlandite than ore from any of the other mines, and requiring different treatment from the massive ores found at the Creighton and Stobie mines.

Miscellaneous mines include the Stobie, 4 miles north of Sudbury, having ores similar to those of the Creighton, No. 3 mine, and various other workings. A quartz quarry, near Naughton, about 15 miles northeast of Sudbury, produces about 150 tons of quartz daily, used for fluxing and lining converter shells. The machine shop, smithy and foundry are under one roof. There is also a fire-proof laboratory building.

Electric power is used throughout the mine and works. A subsidiary corporation of the International Nickel Co., known as the Huronian Co., has a hydro-electric installation at High falls, on the Spanish river, utilizing an effective head of 85', with total available energy of about 10,000 h. p. The power house at High falls is 55x106', of brick and concrete. Installation includes two 3,550-h. p. turbines, with speed of 375 r.p.m., each direct-connected to a 2,000-kw. 2,400-volt 3-phase 25-cycle generator, with space for 2 additional units, of which one is under construction. The transmission line, of about 30 miles length, has double sets of poles, spaced at 130' intervals, carrying 6 bare No. 1 copper wires. At Copper Cliff there is a 100x200' substation, where the current is stepped down to low voltage, and distributed to various motors about the mines and works.

Water for general use and fire protection is stored in a 60,000-gal. steel tank. The company's private railway line has 20 miles of track, connecting with the Canadian Pacific, and is equipped with 9 locomotives, 250 fifty-ton drop-bottom dump cars, and a brick round house.

The smelter, at Copper Cliff, 6 to 20 miles from the various mines, is of 2,500 tons daily capacity. These works were perhaps the first to use the Bessemer process for treating nickel ores. The new plant has taken some ideas from the Tennessee Copper Co., mixed charges of raw and roasted ores being a modification of the Tennessee process.

The smelting plant is served by electric locomotives and has 35x700' ore bins, of 15,000 tons capacity. The 85x375' blast-furnace building, alongside and parallel with the converter building, has five 4x17' 400-ton blast furnaces, set in a row down the center of the building, each furnace having 2 tiers of water jackets, the lower being of 8' 6" and the upper of 6', furnaces having a total height of 35'. The charge carries 11% coke; limestone is used as a flux particularly if the alumina content is high, as it lowers the fusion point and cleans out accretions. The product is matte carrying 6% copper, 16% nickel, 47% iron and 27% sulphur, and is of 4.6 specific gravity. Slags flow into oval 19½x16' settlers, 5½' high, and from the back of the settlers into 22-ton cast-iron slag pots, which are made in sections, with 4 side pieces and a separate bottom. Slags carry 33% silica and 55% iron with 0.04% copper and nickel.

The reverberatory building is about a quarter-mile east of former plant, and is 140x188', of steel, with concrete tile roof, so built that it can be expanded to the southward when necessary. The building is reached by a high-level railway track, 70' above the yard, and has 7,500-ton storage bins for ore, coal and flux. There are electric cranes. This plant will treat flue dust, fine ores, slags and bottoms. There are two 19x112' reverberatory furnaces with walls 27" thick and 6' high, sending matte to the converter plant by rail. Slags are hauled, by locomotives, in 25-ton slag cars. The smokestack is 200' high and 15' in diameter, built of Custodis radial brick,

on a concrete base. The reverberatories will burn coal, pulverized to 200 mesh, with the pulp blown into the furnace by compressed air, giving an intense flame, with close regulation, the coal-drying and pulverizing plant being in this building. Two steam boilers will be fired by waste gases.

The converter building is 60' from the cupola building, and parallel therewith, having a 60x280' main structure, with a shed 35x280' for matting, casting and sculling, and at one end is the relining department, 60x112' with a 35' shed on each side, having a continuation of the crane run of the main building, with storage for material, etc., entire length of the converter building being 522'. The structure is of steel frame, with corrugated sides and roof, having two 50-ton Morgan electric traveling cranes, of 55' 8" span, and a 20-ton auxiliary hoist.

Matte from settlers in the blast-furnace department is poured into cast-steel molds, 5' in diameter and 5' deep, and taken by electric crane to the basic-lined converters, 37' long by 10' in diameter, using 6,500' of free air per minute at a pressure of 10'. The charge of 70 to 80 tons of matte is poured into the converter and 5,000 to 6,000 lbs. of dry, crushed quartz added. The slag is poured off after an hour's blow and more matte and flux added. After that, slag is poured off and a pot of matte and 5,000 lbs. quartz and waste mine rock added every 40 minutes. The entire blow lasts 70 to 80 hours. Stands are controlled electrically from 2 pulpits, each handling 5 stands, each stand having a 30-h. p. induction motor with solenoid brake. Blowing is precisely the same as in treatment of ordinary copper matte, except that the blast is cut off as soon as the iron is fully eliminated. The copper and nickel behave as one metal, similarly to copper alone, up to the final elimination of sulphur and iron. Slag from converters carries 28% silica, 62% iron oxide and $2\frac{1}{2}$ to 3% nickel. It is poured into steel slag pots, lifted by crane to slag cars and taken to the slag-casting machine, which consists of a circular steel framework, of 58' diameter, on a circular track, carrying cast-iron molds, forming a continuous flat ring. The molds, 4x12x30", holding 150 lbs. of slag each, are mechanically rotated under the stream of slag. The cast bricks are allowed to cool before the molds reach a hand-controlled tripper, which reverses the molds, dropping the bricks into a hopper, a chute from the hopper discharging the slag bricks into a skip, that carries them up an inclined track to a 500-ton steel bin above the charging tracks landing to the blast furnace, where they are resmelted.

The works include a small silver smelter, which, 1910, treated about 5,000 tons of silver ore from the Cobalt district, securing therefrom about 8,500,000 oz. fine silver with average returns of about 1,730 oz. silver per ton. Product of the silver smelter is speiss containing silver, nickel and cobalt, sent to the Bayonne works for parting and refining.

The smelter power plant, operated electrically, includes a complete steam plant, held in reserve for emergencies.

A special product of this company is Monel metal, which is a natural alloy of nickel and copper, being merely nickel-copper matte deprived of its sulphur, and averaging 68% nickel, 30.5% copper and 1.5% iron. This metal is noncorrosive, easily worked, and is coming into general use quite rapidly, filling a unique field.

The nickel-copper matte from the converters, carrying 25% copper, 55% nickel, 19% sulphur and one-half per cent iron, is shipped to the Bayonne Works of the International Nickel Co., where it is smelted with sodium sulphite, effecting the separation of the combined nickel and copper, and the resultant copper product is refined electrolytically.

Production was 8,010,000 lbs. fine copper, and 13,996,000 lbs. nickel in

1903; 5,500,000 lbs. fine copper and 9,486,000 lbs. nickel in 1905; 15,746,699 lbs. copper and 26,282,991 lbs. nickel in 1909, and for 1910 was 17,500,000 lbs. copper and 31,000,000 lbs. nickel. Present production is at the rate of 30,000,000 lbs. refined nickel and 4,000,000 to 5,000,000 lbs. fine copper yearly. This mine is the largest nickel producer of the world, and also one of the 40 leading copper mines of the world, with an excellent management.

CANADIAN NICKEL CORPORATION, LTD.

ONTARIO

Owens property in the Sudbury district, Ontario, Canada, including the Murray mine. Company organized about July, 1913, capitalization \$20,000,000, with \$10,000,000 6% debentures. Directors, Dr. F. S. Pearson, J. Frater Taylor, J. E. McAllister, B. B. Lawrence, E. R. Wood, Walter Gow and Miller Lash. Properties cover 17,500 acres and contain 6,800,000 tons of ore blocked out by diamond drilling and underground development. The incorporators, capitalization and holdings are the same as those of the British American Nickel Corporation, which is probably the American holding company.

CANANEA-BOSTON CONSOLIDATED MINING CO.

MEXICO

Office and property: Cananea, Sonora, Mex. Harvey S. Smith, pres.; R. D. Nicholas, vice-pres.; Joseph I. Cohn, sec.-treas. Organized 1912, under laws of Arizona, capitalization \$3,000,000, shares \$5 par. Lands, 2 denouncements, comprising 100 hectares, known as the Siempre Viva and Siempre Viva No. 2, in the Cananea mining district, 1 mile from the city of Cananea and between the Greene-Cananea and Calumet & Sonora properties. Development, 3 shafts; totalling 350' and about 150' of drifts. Land highly mineralized, ore containing silver, copper, lead and zinc. No work has been done for the past 8 months, but company plans resuming operations in the fall, 1913.

CANANEA-BOSTON MINING CO.

MEXICO

Reorganized, 1913, as the Cananea-Boston Consolidated Mining Co. See Vol. X.

CANANEA CONSOLIDATED COPPER CO., S. A.

MEXICO

Office, mines and works: Cananea, Sonora, Mexico. Dr. L. D. Ricketts, pres.; James S. Douglas, vice-pres. and gen. mgr.; George Young, sec.; John V. Montague, treas.; preceding officers and S. P. Applegate, directors. Organized Sept. 30, 1899, under laws of Mexico, capitalization 20,000 pesos, shares 1 peso par. Entire stock owned by Greene Consolidated Copper Co., the C. C. C. Co. being merely the operating company, holding direct title and right to operate the property, as is necessary under the laws of Mexico. Description of the property owned by this company is given under the title Greene-Cananea Copper Co., which corporation owns over 95% of the stock of the Greene Consolidated Copper Co.

In addition to the properties owned by the Cananea Consolidated Copper Co. previous to the formation of the Greene-Cananea Copper Co., it now owns an undivided three-fifths interest in the properties formerly owned by the Indiana Sonora Mining Co., and it also owns a controlling interest in the Superior Bonanza Mining Co., and is at present developing the latter company's properties, which are located near Imuris, in the state of Sonora, Mexico.

No separate financial statement of the Cananea Consolidated Copper Co. is issued, but the combined balance sheet of the Greene Consolidated Copper Co. and the Cananea Consolidated Copper Co., S. A., as of Dec. 31, 1912, shows total assets of \$16,094,174, and total surplus of \$3,776,320. The income account for the same period shows total income of \$7,929,469, and net income, after charging off depreciation, of \$2,280,799.

CANANEA DEVELOPMENT CO., S. A.**MEXICO**

Dead. Formerly a subsidiary of Greene-Cananea Copper Co. All properties transferred to the San Pedro Copper Co., S. A., a Mexican subsidiary of Greene-Cananea Copper Co.

CANANEA-EASTERN MINING CO.**MEXICO**

Address: Cananea, Sonora, Mex. Has a lease and bond on the Cananea Eastern claims, which it acquired from the Charlot Mining & Smelting Co., which in turn had a bond from the Fay-Cananea Copper Co. The Charlot bond is for \$300,000 gold. Property, 20 miles east of Cananea, is reported to cover 500 hectares, or 1,235 acres; containing veins showing chalcopryite ore and lead ore. In May, 1912, company was working 14 men, all in ore, but operations have been curtailed since by revolution.

Property has had a varied career, starting out under the ownership of the Cananea Eastern Co., later the Fay-Cananea Co., and now being operated under the above title.

CANYON COPPER CO.**ARIZONA**

Idle. Office and mine: Grandview, Coconino Co., Ariz. Jno. H. Page, pres. and gen. mgr.; H. H. Smith, sec.-treas., at last accounts. Organized 1902, under laws of Arizona, capitalization \$600,000, shares \$10 par, buying lands of Last Chance Mining Co. Lands, 10 claims, area 200 acres, also a 10-acre mill site, in the Grand Canyon of the Colorado river, having contact deposits between limestone and porphyry, said to give average assays of 30% copper, from cuprite, melaconite, malachite, azurite and chalcopryite. In 1904 produced 350,000 lbs. fine copper and in 1907 made 80,989 lbs. fine copper and some silver.

CAPE BRETON COPPER CO., LTD.**NOVA SCOTIA**

Office: 308-53 State St., Boston, Mass. Mine near Coxheath, Cape Breton Co., N. S. John C. Watson, pres.; Isaac P. Gragg, sec.; J. Dorr, treas. Capitalization \$2,000,000. Property is the old Coxheath mine and adjoining lands, 10 miles from Sidney, Cape Breton, showing several cupriferous veins, of which the principal, averaging 10' width, traverses felsite and diorite, carrying argentiferous and auriferous chalcopryite, in a silicious gangue, ore averaging about 4.5% copper. Deepest shaft, 420'. Idle many years.

CAPE BRETON PROSP., MG. & DEV. CO., LTD.**NOVA SCOTIA**

Office: Sidney, N. S. Letter unclaimed at former mine office, Inverness, Cape Breton Co., N. S. F. W. Morley, pres.; W. F. Dennison, vice-pres.; A. N. McLennan, sec.-treas.; preceding officers, C. V. Wetmore, Dr. A. McLennan, Dr. C. E. McMullen and Hon. D. McNeil, directors; H. N. Borden, mine supt. Organized under laws of Nova Scotia, capitalization \$500,000, shares \$1 par. Property, mineral lands, including the Scottsville mine, which shows copper ore. Idle several years and apparently moribund.

CAPE D'OR COPPER DEVELOPMENT CO.**NOVA SCOTIA**

Mine office: Cape d'Or, Cumberland Co., N. S. Idle many years.

CAPE NOME COPPER MINING CO.**MONTANA**

Office: 1 Dixon Bldg., Missoula, Mont. Mine office: Clinton, Missoula Co., Mont. Edw. Donlan, pres.; F. H. Woody, vice-pres.; H. T. Wilkinson, sec.-treas. and gen. mgr.; preceding officers and A. L. Coffey, directors. Organized Nov., 1906, under laws of Montana, capitalization \$1,000,000, shares \$1 par; issued, \$924,400. Annual meeting, first Monday in June.

Lands, 3 claims, patented, area 40 acres, adjoining the Aladdin Mining Co., showing 4 fissure veins in granite, of which 3 are under development. 1, of 8' average width, traceable 800', being opened by 4 crosscut tunnels, longest 340', and 5 drift tunnels, of 75', 850', 620', 430' and 580', with 3,750' of workings. Equipment includes two 60-h. p. boilers, a 40-h. p. Lidgerwood

hoist and a 12-drill Ingersoll air compressor. There are 6 buildings, including a 35x50' machine shop and 2 small smithies. Property considered promising. Idle, but planned resumption in spring of 1913.

CAPELTON MINE.

Owned by Albert Copper Co., at Capelton, Sherbrooke Co., Que.

CAPITAL MINING & TUNNEL CO.

QUEBEC

COLORADO

Mine office: Georgetown, Clear Creek Co., Colo. Edw. C. Bauman, supt. Property is the Aetna mine, developed by 5,200' tunnel, said to show sulphide ores running up to 18 oz. gold, 35 oz. silver, 55% lead and 5% copper. Mine was in the hands of leasors, early 1911, and is now apparently idle. Has electric as well as steam equipment, Leyner compressor, 200-ton concentrator and employs about 50 men.

CARACAHUI MOUNTAIN COPPER CO., LTD.

MEXICO

Office: 3222 Jefferson St., Kansas City, Mo. Mine near Llano, Magdalena, Sonora, Mex. M. H. Greene, pres. and gen. mgr.; Chas. M. Howell, vice-pres.; H. J. Sprink, sec.-treas.; preceding officers, T. McClure, J. C. Brewer, Thos. James and Wm. R. Berryhill, directors. Organized May 20, 1907, under laws of Arizona, capitalization \$1,500,000, shares \$1 par, non-assessable; issued, \$964,000. Annual meeting, first Tuesday in June.

Lands, 2 groups, area 50 hectares, 9 miles southeast of Llano, between the Calumet & Sonora and Sonora Copper Co. Property is said to show 20 parallel beds in granite, 8 in a cross section of about 250', reported as 4 to 60' in width, and traceable 1 mile, carrying cuprite, malachite and chalcocite, said to average 10 to 40% copper, 4 to 40 oz. silver and \$2 to \$10 gold per ton. Development is by shafts of 50' and 410', and a 195' crosscut tunnel. A test shipment of '60 tons, sent to the smelter at Fundicion, 1908, returned \$14.70 per ton in copper, calculated at 9 cts. per lb.

Equipment includes a 40-h. p. boiler and 8x10" hoist good for 1,000' depth, with smithy, superintendent's house and 6 dwellings for workmen. Management plans installing an air compressor, deepening shaft and cross-cutting. Idle since 1910, but company has no bonded indebtedness, pays all taxes and expects to resume work as soon as peace is restored in Mexico and financial confidence returns.

CARAMBOLA; MINA.

MEXICO

Office and mine: care D. Pablo Palacio, owner, Indé, Durango, Mex. Lands, 18 pertenencias, in 2 groups, opened by La Chusa shaft, of 15 meters, showing a 10' vein of auriferous copper ore, carrying 4 to 30% copper and 30 oz. silver per ton. Average assay values range from 3.5% copper and 300 grams silver, in the silver ore, to 14.5% copper and 100 oz. silver in the best silver-copper ore. Idle on account of revolution.

CARBONATE CENTER MINING CO.

IDAHO

Mine office: Mullan, Shoshone Co., Idaho. Archie Gillis, pres.; John H. Foss, vice-pres.; Thos. G. Kennedy, sec.-treas.; preceding officers, John Erickson and Hans J. Rice, directors. Organized 1912, as successor of Tombstone Mining Co., capitalization \$1,500,000, shares \$1 par, assessable. Lands, 8 claims, near the Carney mine, on Stevens peak, south of Mullan, showing a promising vein of 8 to 15' surface width, carrying a little silver-lead ore. The mine has a 500' crosscut tunnel, with about 1,000' of workings, showing ore that has given assays up to 15% copper and 2.5 oz. silver per ton. Idle, but planned to resume operations late 1913.

CARBONATE CHIEF MINE.

MONTANA

Mine, 6 miles from Alhambra Springs, Jefferson Co., Mont., is the property of Messrs. Steinbronner, Roth and Nellinger, of Helena and Alhambra Springs, and under lease and bond, 1911, to Capt. D. Gay Stivers, J. C. Adams and associates of Butte. Property, 6 claims, developed by

shaft and tunnel, shaft being 200' deep, at last accounts. Ores are mainly gold with values in silver, copper and lead.

CARDENILLO y ARMADILLO; MINAS.

MEXICO

Mine office: Tuxpam, Santiago Ixcuintla, Tepic, Mex. P. Fernando Diaz, owner; A. C. Gonzales, mgr., at last accounts. Mines have silver-copper ores, with steam power, and employs about 50 men when active.

CARDIFF MINING & MILLING CO.

UTAH

Office: 218 South Main St., Salt Lake City, Utah. Mine office: Alta, Salt Lake Co., Utah. Ezra Thompson, pres. and gen. mgr.; J. D. Murdock, sec.-treas. Organized 1906, under laws of Utah, capitalization \$500,000, shares \$1 par. Lands, 15 claims, include the Mountain Chief group, northwest of the Columbus Consolidated, and on the divide between Big Cottonwood and Little Cottonwood canyons. The mine, developed by two 300' shafts and several tunnels, shows a 6' body of ore giving assays of 27.5% copper and 100 oz. silver per ton, opened in the drainage tunnel at depth of about 325'. A little ore, shipped to the Salt Lake smelter, returned up to 2% copper, about 3% lead and 55 oz. silver per ton, with small gold values.

CARDONA; DANIEL.

MEXICO

Office and mine: Veta Grande, Zacatecas, Mex. Property is El Refugio mine, carrying lead, copper, gold and silver ores. Equipment includes a small mill, and property was a small producer at last accounts.

CARIBOU GOLD & COPPER CO.

IDAHO

Office and mine: Gray, Bingham Co., Idaho. Chas. W. Knudson, mgr., at last accounts. Organized Sept., 1903, capitalization \$2,500,000, shares, \$10 par, to develop claims 65 miles southeast of Idaho Falls, in Bingham county, Idaho, said to have an 8' vein, traceable 3,000'. Idle for some years.

CARIDAD; COMPAÑIA MINERA.

MEXICO

Address: Frederick W. Messer, gen. mgr., Silao, Gto., Mex. Owns the Caridad mine near the city of Guanajuato, developed by 50' shaft, sunk, 1913, showing ore carrying 1 to 2% copper with 5 grams gold and 1,377 grams silver per ton.

CARIDAD y ANEXAS; COMPAÑIA MINERA.

MEXICO

Office: care Adolph Marx, pres.; Mexico, D. F. Mine near Guachinango, Mascota, Jalisco, Mex. Otto Vorath, mgr., at last accounts. Capitalization 200,000 pesos. Lands, 180 hectares, on the Rancho Panuco, showing highly argentiferous and auriferous copper ores. Made small shipments, 1907, to the Aguascalientes smelter. Idle.

CARISA GOLD & COPPER MINING CO. OF MAINE.

UTAH

Office: 414 Judge Bldg., Salt Lake City, Utah. Mine office: Mammoth, Juab Co., Utah. Col. C. Edw. Loose, pres.; Edward Riggs, mgr. Organized 1907, under laws of Maine, capitalization \$500,000, increased, Jan., 1909, to \$600,000, shares \$1 par; issued, \$545,000. Was a reorganization of the Carisa Gold & Copper Mining Co., which levied assessments of \$30,000 and paid dividends of \$60,000.

Owns the Carisa and Spy mines with 8 claims, patented, area 57 acres, adjoining the Centennial-Eureka at Mammoth, Tintic district, Utah. Claims said to show 6 orebodies, occurring as fissures in limestone and as contact deposits between limestone and quartzite, 3 of which, more or less developed, of 4' average width, were said, by former management, to give average returns of 5% copper, 3 oz. silver and \$2 gold per ton, from oxidized ores. Mine, as sampled by Newton A. Dunyon, gave average assays of 4.51% copper, 3.54 oz. silver and 0.037 oz. gold per ton. Mine is very pockety, though occasionally carrying rich pockets, and the estimate, by former management, of 80,000 tons of ore blocked out for stoping, was a gross ex-

aggregation, though considerable concentrating ore is in sight. The ore channel has been opened on every level, but the grade of ore encountered is disappointingly low. Mine is opened by 3 shafts, including the 350' Cornish shaft and the 800' Spy shaft, and by a 7,000' tunnel, with about 5 miles of workings.

Mine is worked by Orris Jarman and A. W. Prows, leasers, mining mostly above the 400' level. Produced about 3,000 tons in 1912, partly from old dumps. Producing about 50 tons of 8% copper ore a week in 1913.

CARMAN CONSOLIDATED COPPER CO.

MEXICO

Office: Hibbing, Minn. Operating office: Douglas, Ariz. Mine office: Arizpe, Sonora, Mex. Thos. F. Brady, pres.; J. F. Ross, sec.-treas.; R. B. Phillips, supt.; Dwight E. Woodbridge, cons. engr. Organized 1906, capitalization \$500,000, increased to \$750,000, shares \$2.50 par. Holds title to lands through Compania de Oro y Plata, S. A., organized under laws of Mexico.

Lands, 351 pertenencias, area 877 acres, in 9 groups, in the vicinity of the Pedrazzini and Chispas mines, showing several strong veins, with 1,911' of workings. The Carman and Don Placidio groups have dumps carrying about 1,100 tons of ore, claimed to average 4.65% copper, 62.2 oz. silver and 0.21 oz. gold per ton. The Blanca Rosa group gives ore assaying up to 16.8% copper, 77 oz. silver and 0.42 oz. gold per ton. The Maria group has given ore assaying 3% copper, 107 oz. silver and 1.32 oz. gold per ton. Los Toros group has given ore assaying 4.2% copper, 29% lead, 38 oz. silver and 0.03 oz. gold per ton. Various ore shipments to El Paso smelter have given returns ranging from \$82.98 to \$4,575.79 per ton.

CARMEN AMPLIACION; MINAS DEL.

MEXICO

Mine office: Cerralvo, Cuarto, Nuevo Leon, Mex. Marciano E. Villareal, owner and mgr., at last accounts. Ores are argenteiferous copper and lead sulphides. Idle many years.

CARMEN COPPER CO.

MEXICO

Office: 52 Front St., New York. Mine office: Mineral del Carmen, El Oro, Durango, Mex. Thos. B. Bell, pres.; Stephen A. Levy, sec.-treas.; I. Wayne Von Leer, gen. mgr.; F. C. Seley, supt. Organized under laws of New York, capitalization \$750,000, shares \$50 par. Lands include El Carmen mine, area 160 hectares, and a considerable acreage of miscellaneous lands, 45 miles from Rosario, the nearest rail point. The mine carries argenteiferous copper ores, with considerable development. The mill has 40 stamps, 3 crushers and Frue vanners. Property was under lease to F. C. Alley, at last accounts.

CARMEN CREEK MINING CO.

IDAHO

Mine and office: Salmon City, Lemhi Co., Idaho. J. W. F. Holcomb, mgr. Property is said to carry an oreshoot 60' wide, which has not been verified. Ores are mainly bornite and chalcocite, with small gold and silver values.

CARNEGIE COPPER CO.

VIRGINIA

Address: W. H. McLean, supt., R. F. D., Box 27, Red Oak, Charlotte Co., Va. Lands, 176 acres, carrying about 2,000,000' of timber, about half fit for sawing. Property shows a vein 64" wide at surface, and 5' at bottom of shaft, with a 12" hanging wall paystreak of rich ore. Test shipment, to the Pennsylvania Lead Works, Pittsburgh, gave returns of 10.5% copper, 6.3 oz. silver and \$10.80 gold per ton. Mine has a 76' shaft. Idle since 1906, but has no debts and superintendent expects to resume work in 1914.

CARNEY COPPER CO., LTD.

IDAHO

Office and mine: Mullan, Shoshone Co., Idaho. C. M. Hall, pres.; J. L. Martin, vice-pres. and mgr.; C. D. Miller, sec.-treas.; preceding officers,

Henry Bilberg and A. P. McRae, directors. Organized 1906, under laws of Idaho, with capitalization \$1,500,000, shares \$1 par.

In Sept., 1913, company gave an option on 600,000 shares of stock at 1½ cts. per share for 60 days to Russell F. Collins, of Spokane. He also has a bond on the property for 2 years at 3½ cts. per share, 5% to be paid in 4 months, 5% in 10 months, 15% in 16 months and 75% at end of 2 years.

Lands, 11 claims, 4 fractional, are 175 acres, carrying a good water right, and formerly well timbered, but timber badly burned in the forest fires of Aug., 1910. Mine, next east of the Reindeer, on the northern slope of Stevens peak, about 4 miles from Mullan. Development is by 2 tunnels, the uppermost showing a body of chalcopyrite ore that has not been found in the lower tunnel. The upper, or No. 1 tunnel, is 450' long, with 3 cross-cuts, and No. 2, the lower tunnel, 1,700', about half crosscut and half drift. There also are several open cuts and pits, showing ore of about 3% copper tenor. Workings show up to 4' of solid ore, carrying chalcopyrite, with some bornite. No. 1 tunnel shows an ore shoot up to 40' width, and about 175' long, averaging about 2% copper, with small values in lead and silver, with a paystreak of 6 to 10" assaying 5 to 35% copper. Litigation with Jos. Carney, former owner of lands, was decided in company's favor June, 1908, giving an absolute title. Former buildings, destroyed by the forest fires of Aug., 1910, were rebuilt, and operations resumed, 1912.

CARNEY MINING CO.

ARIZONA

P. G. Carney, pres. and business mgr., Mesa, Maricopa Co., Ariz. Homer Davidson, supt. Property, the Royal Gorge mine, shows a vein with gold-copper ore. Development by 800' tunnel and 100' shaft. Equipment includes gasoline engine and air compressor. Plans cyanide mill for 1914.

CAROLINA COPPER CO.

NORTH CAROLINA

Office: 15 Atwater St. West, Detroit, Mich. Mine near Cullowhee, Jackson Co., N. C. Lewis C. Waldo, pres. and treas.; Thomas A. Cox, vice-pres. and supt; Hugh M. McCormick, sec.; preceding officers, Stephen H. Knight, Geo. W. Clark, Thomas W. Newton, Chas. E. Bredin, David E. Thomas and Edwin P. Snider, directors. Organized Oct. 12, 1901, under laws of Michigan, capitalization \$2,500,000, shares \$25 par; issued, \$1,585,000. Lands, 1,450 acres, freehold, including the Wayehutte mine, showing 4 veins, of 27' estimated average width, carrying mainly chalcopyrite, with estimated average values of 3% copper, 4 oz. silver and \$1 gold per ton, opened by a 55' shaft and a 200' tunnel. Lands also include an undeveloped water power. Idle some years, but regarded as promising if worked under proper direction. Capitalization excessive.

CARP LAKE MINE.

MICHIGAN

Office: care Everitt S. Levitt, Ontonagon, Mich. Property, in T. 51 N., R. 43 W., Ontonagon Co., shows native copper, occurring as irregular streaks of high mineralization, ranging up to 40% in copper tenor, native metal occurring in exceedingly thin flakes, in strata ranging from fine conglomerate to coarse sandstone. Main bed, of about 7' width, apparently is not an extension of the Nonesuch lode, as the strata do not resemble each other physically, though carrying copper in a markedly similar manner. Lands have an excellent water power available, from Carp lake. The mine, opened 1858, has several shallow shafts, and a 1,250' tunnel. Idle many years.

CARRIZO COPPER CO.

MEXICO

Idle. Mine and works at Ayutla, Autlan, Jalisco, Mex., suspended operations late 1912. Very fully described Vol. X.

CASCADE GOLD & COPPER MINING CO.

WASHINGTON

Office: Ashland, Ohio. Mine near Chelan, Chelan Co., Wash. Idle and presumably moribund. Described Vol. X.

CASCADE MINE.**MICHIGAN**

Idle many years. Mine is in Sec. 9, T. 49 N., R. 41 W., Ontonagon Co., Mich. Some "gophering" was done 1853-54, but not enough to afford any criterion as to the merits of the property.

CASH MINING CO.**ARIZONA**

Office: Prescott, Ariz. Property, the Cash mine, now leased to N. E. Getchell, Maxton, Yavapai Co., Ariz. Mine has veins with gold-silver-copper-lead ore, developed by a shaft, with extensive workings. Equipment includes a 10-stamp mill.

CASHIER COPPER MINING CO.**ARIZONA**

Mine office: Mayer, Yavapai Co., Ariz. Hon. M. P. Snyder, pres. and treas.; G. W. Bedbury, vice-pres. and gen. mgr.; Wm. A. Eckerley, sec., at last accounts. Organized Jan., 1905, under laws of Arizona, capitalization \$1,000,000, shares \$1 par. Is controlled, through ownership of majority of stock, by Arizona Diamond Drill Mining Development Co. Lands, 8 claims, area 152 acres, in the Agua Fria district, 5 miles northeast of Mayer, showing country rock of Yavapai schist, carrying lenticular veins of copper ore, with silicious gangue, lenses following the planes of schistosity.

CASHIER GOLD MINING & REDUCTION CO.**COLORADO**

Mine office: Central City, Gilpin Co., Colo. Wm. Auger, supt., at last accounts. Lands include the Pittsburgh, Meeker and Brooklyn mines, latter developed to depth of 800', carrying auriferous and argentiferous chalcopryite and tetrahedrite, principal values being in silver, running up to 700 oz. per ton. Has steam power and has been a small but steady producer, partly from work of lessees.

CASTELLANOS; ANTONIO GOMEZ.**MEXICO**

Office and mine: Compania 48, Zacatecas, Zacatecas, Mex. Property includes Cobriza and Iguana mines, carrying gold, silver and copper ores, and employing about 35 men, when working.

CASTLE COPPER CO.**ARIZONA**

Mine office: Maxton, Yavapai Co., Ariz., Howard R. Ward, mgr. Organized Sept., 1909. Lands, 11 claims, known as the Dunkirk or Mt. Tritle group, 12 miles south of Prescott, on the southern slope of Mr. Tritle, near the head of Slate creek, in the Hassayampa district, formerly owned by Dunkirk Gold & Silver Mining Co., and later by Mt. Tritle Copper Co. Property is an old mine, once worked for gold, having tunnels of 150', 160', 170' and 300', driven at vertical intervals of 100', showing copper and lead sulphides, carrying values in copper, gold, silver and lead, in about the order named.

Equipment includes steam and gasoline power, an air compressor and an electric light plant. A 30-ton mill has 4 Nissen stamps, 3 Wilfley tables, a 100-ton ore bin and a 10,000-gal. water tank. Presumably idle.

CASTLE DOME METALS CO.**NEW MEXICO**

Mine office: Deming, Luna Co., N. M. J. H. Allison, pres.; B. M. Ricketts, vice-pres.; Louis Fritz, treas.; E. Hedburg, mgr., at last accounts. Lands, 12 claims, slightly developed by tunnel, showing ore giving good assay values in copper and silver. Idle.

CASTLE DOME MINE.**ARIZONA**

Office: care McCormack Bros. and O. C. Scott, owners, Miami, Gila Co., Ariz. Lands, 22 claims, 6 miles west of Miami, in Lost Gulch, show schist and diorite carrying low-grade, gold-bearing chalcocite ore, probably in fissure veins. Development is by 3 shafts, deepest 125', and several tunnels.

CASTREJON; HERMANOS.**MEXICO**

Office and mine: Huacana, Ario, Michoacan, Mex. Property is the

China mine, an old and small producer of copper ore, employing about 25 men normally.

CAVE CREEK MINING CO.

CALIFORNIA

Office and mine: Winthrop, Shasta Co., Cal. E. J. McLaggan, superintendent, at last accounts. Property is the Michigan mine, developed by tunnel, showing copper ore, with fair gold and silver values. Idle several years.

CAVERN GOLD MINING CO.

NEW MEXICO

Office: 409 W. Copper Ave., Albuquerque, N. M. Mine office: Kelly, Socorro Co., N. M. B. A. Statz, gen. mgr. G. L. Brooks, pres.; H. O. Brooks, sec.-treas. Organized 1904, under laws of New Mexico, capitalization \$30,000, shares \$1 par, nonassessable; fully issued

Lands, 21 claims, 400 acres, unpatented, in the Magdalen district, show intrusive granite porphyry in lime. Ores are mainly zinc, with copper content under 1%.

Development is by a 200' shaft and 250' tunnel, with about 800' of workings.

Equipment includes a small hoist good for depth of 300', smithy, boarding house, and a small concentrator. Idle since 1903.

CAYUGA DEVELOPMENT CO.

MONTANA

Office: 616 Lyceum Bldg., Duluth, Minn. Mine office: Divide, Silver Bow Co., Mont. C. T. Fitzsimmons, pres.; Nels Anderson, vice-pres.; E. J. O'Rourke, sec.; Max P. Shapiro, treas.; John Helehan, gen. mgr.; preceding officers, Jacob Stein and Jas. L. Norman, directors; Dwight E. Woodbridge, cons. engr. Organized April 4, 1910, under laws of Minnesota, capitalization \$150,000, shares \$1 par, nonassessable; issued, \$65,000.

Lands, 4 claims, area 80 acres, in the Fleecer district, 15 miles southwest of Butte, near the Oregon Short Line railway. Property shows granite, with dikes of porphyry, aplite and quartzite, carrying veins with a generally E.-W. strike, main vein being estimated to range 50 to 125' in width, traceable for 2,000', carrying cuprite, melaconite, malachite, azurite, chrysocolla, chalcopyrite, chalcocite and bornite. Mine has a 100' tunnel, and shafts of 45', 125' and 150', showing ore assaying up to 30% copper, and from a trace to 70 oz. silver per ton. The 125' shaft has crosscuts of 150' and 180', cutting the vein for an apparent width of 30'. The vein at this depth is nearly vertical. Idle, and no work done on property since 1912. There are 5 small buildings. Management plans deepening No. 3 shaft to 400', equipping with an electric hoist, and crosscutting, when water level is reached.

C. B. S. MINING CO.

ARIZONA

Near Globe, Ariz. Claims show several veins with 62' shaft developing a 6' orebody, assaying 9% copper, \$10 silver and \$3 in gold. Vein dipped out of shaft and bottom of workings show a 10" ore streak of native silver. Owned by same people as the Climax Mining Co., near Prescott, Ariz.

CEDAR CANYON SMELTING & REDUCTION CO.

WASHINGTON

Idle. Mine office: Springdale, Stevens Co., Wash. Wm. Sheck, general manager, at last accounts. Lands, on the Columbia river, west of Springdale, show copper sulphides, and company was said to plan a 50-ton mill.

CENTENNIAL COPPER MINING CO.

MICHIGAN

Office: 12 Ashburton Place, Boston, Mass. Mine office: Calumet, Houghton Co., Mich. Quincy A. Shaw, pres.; Rodolphe L. Agassiz, vice-pres.; Geo. A. Flagg, sec.-treas.; Jas. MacNaughton, gen. mgr.; preceding officers, H. F. Fay and Walter Hunnewell, directors; Geo. G. Endicott, asst. sec.-treas.; John Pentecost, mg. capt.; H. E. Jefferson, asst. engr.

Organized 1896, under laws of Michigan, as successor of Centennial Mining Co., capitalization \$2,500,000, shares \$25 par; issued, \$2,250,000; paid in, \$19,50. Last assessment, 1905, was \$4. Is controlled, through ownership of 41,500 shares, by Calumet & Hecla Mining Co., and is a borrower therefrom. Balance sheet of Dec. 31, 1912, showed a deficit of \$3,549.

Profits were \$6,046 net in 1911 and \$50,511 net in 1912. Balance sheet, June 30, 1913, shows assets of cash, accounts receivable and copper, \$140,723; supplies, \$34,203; total, \$174,926. Liabilities for notes and accounts payable, \$146,287; balance, \$28,639. American Trust Co., Boston, transfer agent; Old Colony Trust Co., Boston, registrar. Annual meeting, first Tuesday in April.

Lands, 670 acres, being Sec. 12, T. 56 N., R. 33 W., and a triangular patch of about 30 acres, at the southeastern corner of the main tract, bought to secure the outcrop of the Kearsarge lode, and including about 10 acres, bought 1905, of the Old Colony, for the surface plant. The first work was done, 1863, by the Schoolcraft Mining Co., which failed to open a paying mine, and was reorganized, 1876, as the Centennial Mining Co., and again reorganized, 1896, with present title. Expenditures of upwards of \$1,500,000 were made by the old companies, in unsuccessful efforts to open a paying mine on the northern extension of the Calumet conglomerate. Seven shafts, 3 of considerable depth, were sunk on this bed, No. 3, the deepest, being bottomed at 3,200'. The Centennial lands are in the great mining camp of Calumet, and are available for building purposes. Two additions have been platted, and surface rights sold at good prices, mineral rights being reserved.

The present company did a little work, 1897, on the old conglomerate shaft, then turned attention to the Osceola bed, deepening 2 shallow shafts to 1,050' and 1,150' depth, respectively, shafts being 17x12' inside of timbers, sunk at 38°. The Osceola bed, where opened on the Centennial tract, averages about 15' in width, but is lean.

Work on the Kearsarge bed was begun Sept., 1899. Owing to the outcrop of the Kearsarge occurring on the 30-acre tract bought of the Osceola, with only a 100' right-of-way connecting it with the main tract, it was necessary to open the mine on the Kearsarge bed in a peculiar manner, by 2 shafts. These are but 90' apart, on surface, and continue parallel, on the dip of the bed, until the 13th level, when the main tract is reached, after which No. 2 shaft diverges from No. 1 at an angle of 15° on the plane of the bed, 300' being taken by the curve. This method of opening gives short drifts until the shafts enter the main Centennial tract. Each shaft is 17x18' inside of timbers, with 3 compartments, sunk at an angle of 39° with the horizon, through an overburden of about 100' depth. The Kearsarge bed averages about 16' in width, and showed fair copper values in the upper levels, followed by a comparatively barren zone until the 14th level, when there came a gradual improvement, which unfortunately has not been maintained, the mine as a whole proving disappointing. No. 18 shaft of the Calumet & Hecla will soon reach the Centennial boundary line. New openings, made during 1912, amounted to 2,639', all contributory to the No. 2 shaft.

No. 1 shaft, 3,816' deep, can be sunk 12,000' before reaching the boundary, and is idle since 1910. No. 1 has a steel shaft rock house, with 3,000-ton bins and a 32x72" Nordberg duplex hoist, with double conical drum, good for depth of 6,000', operating 5-ton skips.

No. 2 shaft, 4,000' deep, shows fair ground from the 18th to the 31st levels, inclusive. This shaft shows poor ground to within 50' of the South Kearsarge boundary, where drifts were stopped. The South Kearsarge drifts are in rich ground up to the boundary, which seems strange. Equip-

ment includes a cylindrical steel shaft rock house with 1,000-ton bins, and a 32x60" Sullivan duplex straight-face hoist, with 2 drums of 14' diameter and 15' 6" winding face, grooved for 1½" cable. The hoist is fitted with devices to prevent overwinding, and is calculated to raise 5-ton skips at the rate of 4,000' per minute, operating under 150 lbs. steam pressure.

The mine buildings are of redstone, and include duplicate engine houses for the 2 shafts. The new compressor house, has a 70-drill, 2-stage compound air compressor, and the old compressor house has 35-drill Nordberg and 20-drill Rand air compressors, with a Dean jet condenser in the basement. A boiler house has four 125-h. p. Burt locomotive firebox boilers, and a 125' brick-lined self-supporting steel smokestack of 7' diameter.

The mine is served by the Copper Range and Mineral Range railroads, and has a private line connecting the shops and shafts.

Rock is stamped by the mill of the Lake Milling, Smelting & Refining Co., which is separately described. Average force employed, 1912, was 128 men.

The mine made a small production, 1898 and again in 1901, but began its real production July 5, 1904, since when the output has been as follows: 641,294 lbs. fine copper in 1904; 1,446,584 lbs. in 1905; 2,253,015 lbs. in 1906; 2,373,572 lbs. in 1907; 2,196,377 lbs. in 1908; 2,583,793 lbs. in 1909; 1,572,566 lbs. in 1910; 1,493,834 lbs. in 1911, and 1,742,338 lbs. in 1912. Rock discarded was 13.93% in 1906; 11.02% in 1907; 5.68% in 1908, and only 1.04% in 1912. Rock stamped yielded 13.58 lbs. per ton in 1906; 11.86 lbs. in 1907; 12.94 lbs in 1908; 14.15 lbs. in 1909; 15.4 lbs. in 1910; 17.26 lbs. 1911; 16.36 lbs. in 1912 and 18.21 lbs. for the first half of 1913.

Total cost of finished copper per lb. was: 18.49 cts. in 1908; 15.61 in 1909; 14.48 in 1910; 12.69 in 1911; 13.46 in 1912 and 12.15 cts. per lb. in the first half of 1913.

Production of finished copper Jan. 1 to July 1, 1913, was 1,135,000 lbs.

CENTENNIAL DEVELOPMENT CO.

NEVADA

Office and mine: Ely, White Pine Co., Nev. E. E. Vanderhoef, pres. and gen. mgr.; D. C. McDonald, vice-pres.; G. F. Boreman, sec. and treas.; Sol Snider, supt. Organized April 20, 1911, under laws of Nevada, as successor of the Ely Centennial Copper Co., capitalization \$1,000,000, shares \$1 par; issued 400,000 shares. Has called total assessments of \$15,198.46 to end of 1912. Annual meeting, first Tuesday in December.

Lands, 5 claims, about 75 acres, in the city limits of Ely, between the McDonald-Ely and Ely-Calumet, in the eastern portion of the Robinson district. Mine has two 50' shafts and a 2,000' tunnel shows a 400' zone of crushed silicified limestone with low-grade copper ore. Property recently idle for lack of funds, has been leased for a year, and operators have run a drift on a 1 to 2' streak of 25% copper ore from the bottom of the 200' Mezger winze.

CENTENNIAL-EUREKA MINING CO.

UTAH

Office: 55 Congress St., Boston, Mass. Operating office: Newhouse Bldg., Salt Lake City, Utah. Mine office: Eureka, Juab Co., Utah. Wm. G. Sharp, pres.; Albert F. Holden, managing director; preceding officers, B. Preston Clark, J. J. Storrow, Sidney W. Winslow and C. G. Rice, directors; F. Winthrop Batchelder, sec.-treas.; Clarence E. Allen, mgr.; A. P. Mayberry, supt. Organized 1876, under laws of Utah, and reorganized, 1899, under laws of Maine, with capitalization \$5,000,000, shares \$25 par; issued, \$2,500,000. Is controlled by United States Mining Co., through ownership of 99,864 shares of the 100,000 shares of issued stock, there being only 4 other shareholders. Dividends were \$7 per share in 1906, \$2.50 in 1907; \$11.50 in 1908;

nothing in 1909, and \$6 in 1910, 1911 and 1912, a total of \$36 per share, or \$3,600,000. Annual meeting, third Wednesday in April.

Property, in the Tintic district, includes the Centennial, Eureka, Tintic, Dove, Swan and Pelican group. Ores carry fair values in gold, silver, copper and lead. Shipments average 300 tons daily.

Development is by a 2,225' shaft, and the 2,160' Holden tunnel, completed 1909, connecting with the shaft just below the 500' level. This tunnel permits the ore to be delivered directly to railroad cars, eliminated the rope tramway and handles the water from the mine. During 1911-12, only a limited amount of development work was carried on. Ores are shipped to the Midvale smelter of the U. S. Smelting Co., at West Jordan, Utah. The mine is timbered with square sets, and formerly was dry, but the lower levels are wet, water being handled by a 500-gal. Sulzer-Winterthur electric pump. About 300 men are employed. Surface equipment includes steam and electric power with necessary engine houses and shops.

Production of ore during 1912 was 117,957 tons as against 108,275 in 1911; 90,375 in 1910; 109,430 in 1909; 122,855 in 1908, and 104,916 tons in 1907.

CENTENNIAL MINE

COLORADO

Office and mine: Georgetown, Clear Creek Co., Colo. David Kennedy, owner and mgr.; S. G. Evans, supt., at last accounts. Lands, 640 acres, having cupriferous gold and silver ores in a 30" paystreak, assaying up to 24% copper, 5 to 50 oz. silver and 3 to 5 oz. gold per ton. Has steam power.

CENTRAL MINING & DEVELOPMENT CO.

ARIZONA

Mine office: Winkelman, Pinal Co., Ariz. C. G. Werner, pres., treas. and gen. mgr.; F. G. Angeny, vice-pres. and sec.; preceding officers, Chas. E. McGee, T. C. Wells and David McClure, directors; F. B. Garden, supt., at last accounts. Organized July 13, 1906, under laws of Arizona, capitalization \$10,000,000, shares \$1 par. Property was bought for \$6,000 and capitalized at \$10,000,000. The three chief promoters were convicted of fraud in connection with the company's affairs and sentenced to Leavenworth. See Vol. X.

Lands, 9 claims, 1 fractional, area 175 acres, a mill site and a 160-acre ranch. Lands include the Two Queens mine, 7 miles from a railroad, having 4 nearly parallel veins and a cross vein, 1 vein showing surface ore claimed to assay \$200,000 gold per ton, which is far too good to be true. Mine has shafts of 21', 38', 50', 155' and 184', and a 440' tunnel, showing ore with quartz gangue, from which selected samples have given high assay values in gold and silver, with a little copper. Had a 25-h. p. gasoline hoist and an air compressor at last reports. Despite the marvelous assays, 3 small smelter shipments, 1907, gave returns of only \$36.53 per ton. Idle and presumably moribund.

CENTURION ARIZONA MINING CO.

ARIZONA

Office: Wilcox, Ariz. Mine office: Dragoon, Cochise Co., Ariz. J. P. Richardson, pres. and gen. mgr.; Samuel Bennett, vice-pres.; H. A. Morgan, sec.-treas.; preceding officers, S. N. Kemp, J. C. Page, J. W. Angle and H. E. Dunlap, directors. Organized July 26, 1906, under laws of Arizona, capitalization \$1,000,000, shares \$1 par, nonassessable; issued, \$527,000.

Lands, 23 claims, 5 fractional, area 240 acres, and a 5-acre mill site, 2 miles northwest of Dragoon, in the Dragoon mountains. Property shows a contact deposit between pre-Cambrian limestone and altered schist, averaging about 15' in width, and carrying azurite and malachite, associated with hematite. Ores carry an average of 2.7% copper. Development is by a 650' incline shaft, several shallower shafts ranging from 40 to 100' in depth, and a 3,000' tunnel, with about 5,000' of workings, estimated by management to show 160,000 tons ore in sight. Equipment includes a 15-h. p.

gasoline hoist, good for 800', a small air compressor, a machine shop, smithy and other necessary mine buildings. Property considered promising.
CENTURY COPPER & GOLD MINING CO. **NEW MEXICO**

Office: Wheeling, W. Va. Mine office: Lordsburg, Grant Co., N. M. Lands, 6 claims, area 120 acres, in the Shakespeare camp, developed by 3 shafts, deepest 100'. Equipment includes a small steam hoist, air compressor and several mine buildings. Presumably idle.

CENTURY DEVELOPMENT CO. **NORTH CAROLINA**

Idle. Mine office: R. F. D. 1, Greensboro, Guilford Co., N. C. W. B. Feakins, pres.; Frank F. Hesse, sec.-treas.; Chas. E. Dickens, supt., at last accounts. Organized under laws of Maine, capitalization \$300,000, shares \$10 par; issued, \$138,000. Bonds, \$10,000, authorized, at 6%; issued, \$5,000. Annual meeting, third Tuesday in December.

Lands, 92 acres, freehold, known as the North Carolina or Fentress mine, said to have produced considerable ore of 14 to 20% copper tenor, previous to the American Civil War. Property shows 3 contact deposits, between granite and diorite, of 3 to 4' width, with outcrop traceable for 3 miles, having an oreshoot of 80 to 90' length, carrying auriferous chalcopyrite and pyrite in quartz gangue, values being mainly in gold. Management reports average assays of 8% copper, 3 oz. silver and up to \$12 gold per ton. Mine has shafts of 269', 80', 55', 303' and 175', and a 431' tunnel, with about 3,000' of workings. Property was opened 1840, closed 1856, reopened 1900. Mine has a 250-h. p. steam plant, with a 50-h. p. hoist and 10-drill air compressor. There are 7 buildings, including a machine shop, carpenter shop, smithy, etc. The mill, of wood, has 10 stamps, built by the Mecklenburg Iron Works, and a Blake crusher.

CERRITO MINING CO., S. A. **MEXICO**

Office: care Robt. Brooks, pres., Bisbee, Ariz. Organized Jan., 1909, under laws of Mexico, capitalization 100,000 pesos, shares 1 peso par, full paid, but assessable for taxes and legal expenses only. Annual meeting, second Monday in January.

Lands, well watered and timbered, formerly held by Brooks Consolidated Copper Co., and previously by Cochise Prospecting, Mining & Development Co., are 251 hectares, in 3 groups, in the Tordillo district of the Sierra Ajo, 45 miles northeast of Cananea, Sonora, and near Naco, Ariz. The ore zone, of 200 to 600' width, traceable 5,800', shows oxide, carbonate and sulphide ores, latter predominating, with occasional small pockets of high-grade lead ore, latter carrying 16 to 42 oz. silver, copper ore being estimated to average 8% copper, 4% zinc and \$5 to \$6 gold per ton. Development is by tunnels of 160' and 670'. Idle, owing to lack of funds. Property considered promising.

CERRITOS MINE. **MEXICO**

J. P. Harvey and C. E. McCormick, owners, Ameca, Jalisco, Mex. Property the old Cerritos copper mine, recently under option to the Almoloya y Anexas Co., but relinquished 1912. A body of high-grade copper ore averaging better than 10% was cut on the 300' level, Feb., 1913. The option price was \$25,000.

CERRO AZUL MINING CO. **MEXICO**

Idle. Property is the Cerro Azul mine, near Imuris, Magdalena, Sonora, Mex., carrying copper ore, with gold and silver values.

CERRO DEL COBRE MINING CO. **MEXICO**

Idle and presumably moribund. See Vol. X.

CERULEAN COPPER MINING CO. **WYOMING**

Office: 10 Fox Bldg., Green Bay, Wis. G. W. Youngs, pres.; H. L. Larsen, vice-pres.; J. S. Armstrong, sec.-treas.; preceding officers, H. O. Gran-

berg and O. T. Gilbert, directors. Organized July 21, 1906, under laws of Wyoming, capitalization \$1,000,000, shares \$1 par; issued \$682,000. Lands, 6 claims, 117 acres, patented, in the Battle Lake district, near Copperton, Carbon county, showing contact deposits between limestone and quartz, opened by seven 10' pits, and shafts of 30', 48' and 65'. Idle since 1907.

CHAINMAN CONSOLIDATED COPPER CO.

NEVADA

Office: 14 Wall St., New York. Mine office: East Ely, White Pine Co., Nev. Arthur Smith, resident agent. Percy Bullard, pres.; C. Kelleher, vice-pres.; F. W. Holmes, sec.-treas.; W. F. Boland, asst. treas.; preceding officers, H. A. Gray, F. E. Windsor and L. Timmerman, directors. Organized Feb. 4, 1907, under laws of Maine, capitalization \$5,000,000, shares \$5 par, nonassessable; fully issued. Is controlled by Consolidated Coppermines Co., through ownership of practically entire share issue.

Lands, 12 claims, partly fractional, partly patented, 2 miles from Ely. Mine was opened, 1869, for gold, but values turned to copper in the lower workings. The old mine has a 300' shaft, with about 3 miles of workings, showing perhaps 200,000 tons of auriferous and slightly argentiferous iron ore. There is a strong surface showing of iron oxides, carrying \$1.50 to \$10 gold per ton, which apparently may be underlaid by large bodies of copper ore, and the iron ore should be valuable for flux, especially as it contains very fair average gold values. Apparently the old Chainman shaft has been abandoned, and mine is opened by 2 new shafts, known as the Aultman and Chamberlain, of 200' each. Equipment includes steam and electric power and an air compressor.

CHALCHIHUITES; COMPAÑÍA BENEFICIADORA DE MINERALES DE, S. A.

MEXICO

Office: Mexico, D. F. Mine office: Chalchihuites, Sombrerete, Zacatecas, Mex. Theo. Montgomery, pres.; Adolfo Trauwitz, sec.; Paul W. Meyer, treas. Organized March 6, 1907, under laws of Mexico, capitalization 50,000 pesos, as the Mexican incorporation of the National Smelting Co., and property is described under latter title.

CHALCHIHUITES MINING CO., S. A.

MEXICO

Idle. Mine office: Chalchihuites, Sombrerete, Zacatecas, Mex. Milton R. Straight, pres.; Francis E. Agnew, vice-pres.; Jose de Ranchos, sec. Organized Oct., 1909, under laws of Mexico. Property includes La Florencia, San Felipe and Ampliacion de Milagros mines, near Chalchihuites, carrying values mainly in silver. Operations suspended by revolution in 1912-13.

CHAMPION COPPER CO.

MICHIGAN

Office: 82 Devonshire St., Boston, Mass. Mine office: Painesdale, Houghton Co., Mich. Mill office: Redridge, Houghton Co., Mich. Wm. A. Paine, pres.; Chas. J. Paine, Jr., vice-pres.; Frederic Stanwood, sec.-treas.; Frederick W. Denton, gen. mgr.; preceding officers, Samuel L. Smith, Geo. P. Gardner, Nathaniel H. Stone and Hon. Richard Olney, directors; John Jolly, underground supt.; Edw. Koepel, mill supt.; M. L. Cunningham, asst. mill supt.; H. F. Mercer, chief engr.; E. W. Kruka, chief clerk; John Trewarrow, mg. capt.; W. J. Richards, master mechanic.

Organized Dec., 1899, under laws of Michigan, capitalization \$2,500,000, shares \$25 par. Is controlled jointly by Copper Range Consolidated Co. and St. Mary's Mineral Land Co., through equal ownership of stock, and owns \$110,000 stock in the Michigan Smelting Co. Net earnings were \$909,383.88 in 1907; \$777,480.14 in 1908; \$816,637.55 in 1909, company ending 1912 with a surplus of \$943,875.84. Dividends have been as follows: \$3 in 1903; \$2 in 1904; \$10 in 1905; \$12 in 1906; \$10 in 1907; \$5 in 1908; \$8 in 1909; \$9 in 1910; \$5 in 1911, and \$11 in 1912, a total of \$75 per share, or \$7,500,000.

Lands, 1,240 acres, being the S. $\frac{1}{2}$ of Sec. 30, W. $\frac{1}{2}$ and N. $\frac{1}{2}$ of N. E. $\frac{1}{4}$

and S. W. $\frac{1}{4}$ of N. E. $\frac{1}{4}$ of Sec. 31, T. 54 N., R. 35 W., practically all on the mineral belt. Neighbors are the Copper Range and Trimountain on the north, lands of St. Mary's Co. and Hussey, Howe & Co. on the east; Hussey-Howe lands and the Globe tract on the south, and Copper Range lands on the west. The tract carries 9,047' on the strike of the bed, and, at the present angle of dip, the deepest shaft could go down to the impossible depth of 18,950' before reaching the western boundary.

Development was begun in 1899, under direction of Dr. L. L. Hubbard, and 3 parallel amygdaloidal beds were uncovered by trenching, one of which, the Baltic, showed phenomenal copper values. The 2 amygdaloids paralleling the Baltic bed showed copper in sufficient quantities to render their future exploration advisable. A fourth amygdaloidal bed, about 15' wide, discovered 1901, east of the Baltic bed, carries heavy copper to an encouraging extent, and there also is a fissure vein of arsenical ore, apparently algodonite (copper arsenide) near "C" shaft. The width of this vein at surface is slight, and mineral contents variable, but on the second level the fissure is 2' wide, and well mineralized.

The dip of the Baltic bed at the Champion is about 70° and strike same as at the Trimountain, not the easterly trend of the Baltic mine. The bed runs 13 to 45' and averages 24' width, carrying more epidote than at the Trimountain and Baltic. The surface of the tract is very hilly, but the overburden is less than is found either to the northward or southward. The stretches of lean ground in the mine are few, and the bed carries heavy copper in profusion, mostly in barrel size, but running up to masses of 10 tons in weight. Only about 60% of the rock broken is hoisted, waste rock being sorted out and used for dry walling, packing itself.

All shafts are connected on numerous levels and about 2 miles of new workings are made yearly. The bed shows so little poor ground that nearly every level will be opened from end to end of the mine, eventually giving the longest average drifts of any Lake Superior property. The only really poor ground found in the mine was shown in "E" shaft, between the 3d and 4th levels, and the mine shows some stopes of phenomenal width and richness. The ground opened, 1912, was of average value.

The mine is developed by 4 shafts, named from north to south, with room for additional shafts. There is no "A" shaft; "B" shaft, the northernmost, is 1,835' south of the Trimountain boundary, with collar 635' above mean water datum of Lake Superior and is 2,356' deep. "C" shaft, 1,050' south of "B", is 1,616' above the lake and is 2,334' deep. "D" shaft, 1,300' south of "C", is 631' above the lake and is 2,168' deep. "E" shaft, 1,300' south of "B" and 3,900' north of the Globe boundary, is 2,388' deep. The third level of "E" shaft has been driven 3,000' toward the Globe boundary. "F" shaft, started 1,300' south of "B," was abandoned on account of treacherous overburden, but the Baltic bed was located, 1907, by diamond drill, at a new site, 1,800' south of "E," and 2,100' north of the Globe boundary.

The shafts are practically duplicates in all essential particulars, having 40x50' shaft rock houses, with 90-ton ore bins, enlarged, 1908, by the Wisconsin Bridge & Iron Co. Equipment at each rock house includes a steam hammer for heavy copper, and one 12x15" rock crusher, taking everything hoisted from the mine direct from chutes. The shafts have duplicate first-motion Nordberg hoists with 24x60" duplex cylinders and double conical drums of 14' diameter, with capacity for two 3,000' cables each, hoisting 6-ton skips. The boiler houses have Bradley and Burt boilers, with coal trestles connecting. Water for boilers is furnished from a 12,000,000-gal. dam, 30' from hardpan foundation to crest, with a cement core, 5' wide at the bottom and 2' at the top, reinforced by rock.

Very extensive use is made of electric power on surface, and there are some underground electric pumps. The electric plant at "F" shaft has a 250-kw. General Electric generator, direct connected to an Allis-Chalmers cross-compound vertical engine.

The main compressor building at "F" shaft, of steel, has a 100-drill Nordberg quadruple expansion 2-stage air compressor, with capacity to compress 9,120 cu. ft. of free air per minute to a pressure of 70 lbs. per inch. The compressor operates at a steam pressure of 280 lbs., and has a regenerative feed-water system. Power is furnished by three 250-h. p. Geary water-tube boilers. At "B" shaft there is a 40-drill Ingersoll-Sergeant cross-compound 2-stage air compressor with vertical receiver inter-cooler. The electric plant, with a 100-kw. generator, is in the main compressor building.

Buildings at the mine include a machine shop having a traveling crane and trolley rail for its entire length, with a 30-h. p. electric motor.

The stamp mill at Freda, on Lake Superior, 2 miles west of Redridge, is 215x400', of steel frame on concrete foundation, with floors terraced, and an addition 75x270', built 1912, houses the regrinding machinery. An experimental graded crushing plant, described Vol. VII, has been abandoned, as were cross-compounded stamp heads, in 1906. The mill has been remodeled and enlarged at various times, and now has 6 Nordberg stamps, there being 4 compound stamps, with 15½" cylinders, each treating about 700 tons daily, and 2 simple stamps, with 28" cylinders, of about 660 tons daily capacity each, giving the mill a total capacity of fully 4,000 tons daily.

The concentration department was remodeled, 1908, and given additional tables and larger settling tanks. The wash for the heads has Hodge graduated adjustable-speed jigs, with plungers working simultaneously or alternately, in pairs, Woodbury jigs and Deister concentrating tables. Raggings are reground by Allis-Chalmers crushing rolls having 1 roll fixed and the other in a spring bearing. The preliminary discharge from the stamp heads is treated on very large jigs, having 30x48" sieves, of punched steel, with one-eighth inch openings, installed in connection with the head. Each head has a V-shaped settling tank, 40' long, 9' deep, 12' wide at the top and 6' wide at the bottom, slimes being drawn from spigots at the bottom. The flow of water through the settling tanks does not exceed 6' per minute.

The mill is heated by hot water from a Green fuel economizer, piped at 300 to 350° F. to a steel-clad chamber, whence heated air is drawn into ducts by a Sturtevant blower, and distributed through the mills, the water being pumped back to the economizers and thence fed to the boilers.

The steel boiler house has four 200-h. p. Stirling boilers, 5 Dutch oven Scotch marine boilers and 2 Hawley down-draft furnaces. Automatic stokers were tried, but discarded. Coal is brought to the boilers by tram, and reduced to uniform size by a grinder before feeding to the grates, and ashes are washed into the lake through a launder. Exhaust steam passes through dry condensers, thence to a hot well, from which water is fed to the boilers. Power for the mill is supplied by a 500-h. p. Nordberg cross-compound engine, having 14" and 32" cylinders, with 30" stroke, with a 180-h. p. engine in reserve.

The steel pump house, with truss roof and traveling crane, has a 20,000,000-gal. Nordberg triple-expansion pump. Water for the mill and boilers comes from the lake through a 1,020' tunnel, the shore end having a well with bottom 8' lower than the lake level, this being the longest tunnel ever driven under Lake Superior. The intake crib has an area of 45 sq. ft. and, with a second crib, the tunnel could furnish water for 10 stamps. Water cost is less than 1½ cts. per ton of rock stamped. Screens have been

installed in the tunnel, obviating the trouble formerly caused by sand and wood pulp in the water.

Rock stamped was 708,685 tons, returning 23,268 lbs. fine copper in 1907; 794,703 tons, returning 22.38 lbs. in 1908; 753,908 tons, returning 23.88 lbs. in 1909; 722,051 tons, returning 26.62 lbs. in 1910; 734,392 tons, returning 21.29 lbs. in 1911, and 765,306 tons, returning 22.508 lbs. in 1912. Costs for 6 years have been as follows: 9.05 cts. per lb. for finished copper, delivered, in 1907; 8.34 cts. in 1908; 8.45 cts. in 1909; 7.85 cts. in 1910; 9.63 cts. in 1911, and 8.88 cts. in 1912. Recent production has been as follows: 16,954,986 lbs. fine copper in 1906; 16,489,436 lbs. in 1907; 17,786,763 lbs. in 1908; 18,005,071 lbs. in 1909; 19,224,174 lbs. in 1910; 15,369,426 lbs. in 1911, and 17,225,508 lbs. in 1912. The Champion is one of the largest and richest of Lake Superior mines and has been admirably managed. The mine has by no means reached its ultimate limit of output, and is capable, with the present mining and milling equipment, of producing nearly or quite 25,000,000 lbs. fine copper yearly.

CHAMPION COPPER CO. NEW MEXICO

Idle. Office: 22 Congress Sq., Boston, Mass. Mine office: Rinconado, Rio Arriba Co., N. M. Samuel Littlefield, pres.; Arthur M. Gripps, vice-pres.; Thomas A. Maloney, treas.; Wm. Q. Huey, gen. mgr., at last accounts. Organized under laws of Maine, capitalization \$2,000,000, shares \$1 par.

Lands, 5 claims, patented, area 100 acres, also four 5-acre mill sites and a 40-acre water right, on Copper hill, in the Copper Mountain district of Taos county, 9 miles east of Embudo, the nearest railroad station, and 25 miles northeast of Taos. Property is said to have 8 practically parallel veins of 18" to 20' width, between a schist footwall and quartzite hanging wall, carrying cuprite, malachite and chrysocolla, succeeded at depth by chalcocite and gray copper, ore all argentiferous and auriferous, with chalcopyrite beginning to show in lower workings, all with quartz gangue. Development includes a small amount of work in shallow shafts and surface cuts on several claims, a 145' shaft sunk on a 4' vein in the Oxide mine, and a 300' tunnel, property as a whole having 1,800' of workings. Equipment includes a Leyner air compressor, in the mill, which is 50x100' in size, with a 20x30' power house adjoining. A 1,000' ground tram leads from the mouth of the Champion tunnel to ore bins. Improvements include a 15,300' gravity pipe line, of 7" spiral steel-riveted pipe. Was not regarded favorably by the late Horace J. Stevens.

CHAMPION COPPER MINING CO. IDAHO

Idle. Office: 311 Sprague Ave., Spokane, Wash. Mine near Mullan, Shoshone Co., Idaho. Adam O'Donnell, pres. and mgr.; Wm. J. Coates, sec.; J. H. Wourms, treas.; preceding officers, Patrick Sullivan and F. C. Robinson, directors. Capitalization \$1,500,000, shares \$1 par, assessable. Lands, 6 claims, south of the Reindeer mine, 3 miles from a railroad, near the head of Boulder creek, on the southern slope of Stevens peak, 4 miles south of Mullan. Property is said to show a mineralized zone of 75 to 100' width, with a vein ranging up to 25', carrying chalcopyrite and occasional bornite, said to average about 5%, with quartz and calcite gangue. Development is by 2 tunnels, lower of about 900'.

CHAMPION MINING CO. IDAHO

Idle. Office: Utah National Bank Bldg., Salt Lake City, Utah. Mine office: Mackay, Custer Co., Idaho. Edw. R. Hall, pres.; C. T. Mixer, vice-pres.; R. T. Badger, sec.-treas.; preceding officers, O. D. Mallory and J. E. Frick; directors; H. A. Brown, supt. Organized 1905, under laws of Utah, capitalization \$100,000, nonassessable. Lands, 9 claims, unpatented, in the

Alder Creek district, 6 miles from a railroad. Mine is developed by tunnel, with about 1,500' of workings, showing argentiferous lead and copper ores.

CHANCE COPPER MINING CO.

NEVADA

Office: Payson, Elko Co., Utah. Leffler Palmer, pres.; A. O. Packard, treas.; R. A. Porter, sec., at last accounts. Organized Aug., 1911, capitalization \$250,000, shares 25 cts. par. Property, 7 claims, in the Ferber mining district, developed by 50' shaft. Presumably idle.

CHASE CREEK COPPER CO.

ARIZONA

Mine office: Clifton, Greenlee Co., Ariz. Clarence K. McCornick, pres.; H. G. Smith, treas.; S. S. Campbell, mgr.; Isaac N. Stevens, supt. Capitalization \$5,000,000. Lands, 52 claims, area 1,040 acres, 8 miles west of Clifton, having a 2,300' tunnel, 6x8', on lands adjoining the Longfellow mine, cutting the Longfellow orebody, of concentrating grade, at a distance of 493', having a back of about 900', showing low-grade sulphide copper ore. Tunnel practically reaches the Coronado railroad, permitting advantageous shipments. Was making small shipments to the Shannon smelter, early 1913. Property considered promising.

CHECAP MINING CO.

WASHINGTON

Organized by Spokane capitalists in May, 1913, to operate the Checap mine, Chewelah district, Stevens Co., Wash.

CHELAN CONSOLIDATED COPPER CO.

WASHINGTON

Office: 180 Broadway, New York. Operating office: 417 Pacific Block, Seattle, Wash. Mine office: Leavenworth, Chelan Co., Wash. Hon. Jos. A. Goulden, pres.; Frank D. Wilsey, vice-pres.; Thos. J. Higgins, sec.-treas.; preceding officers, Henry D. Bristol, Edw. W. Kuhn, Albert T. La Vallette and Louis Arndt Stein, trustees; Michael J. Corcoran, asst. sec.-treas. Organized May, 1906, under laws of Washington, capitalization \$12,000,000, shares \$10 par. nonassessable; issued, \$5,779,140. Guaranty Trust Co., New York, registrar. Annual meeting, first Tuesday in June. Company controls the North Star Mining Co. and operates its properties.

Lands, 144 claims, area 2,880 acres, including 14 claims, area 280 acres at Index, Snohomish Co., Wash., and 130 claims in the forest reserve of Chelan county. Original promoters advertised the property as 101 producing mines, which was a colossal lie, but shareholders ousted these men and took control. The Chelan county property is 48 miles northwest of Red mountain, with a fair wagon road and an 18-mile railway of the Lamb-Davis Lumber Co. connecting.

The Index property, 11 claims, between the Ethel and Bunker Hill Sullivan mines, has a 4' vein, opened by tunnels of 600' and 700', with about 2,000' of workings, showing a 6" paystreak of high-grade bornite and chalcopryite ore.

The Red Mountain lands, unpatented, 4 miles west of Phelps creek, include 67 claims owned outright, and 58 additional claims held through the North Star Mining Co., which is controlled through stock ownership. Development is by a 2,000' main tunnel, supplemented by 600' of diamond-drill borings, showing a 5' vein carrying good assay values in copper and gold, and 2 smaller veins. Equipment includes gasoline power and an Ingersoll air compressor, and there are 6 or 7 buildings. Company plans doing further diamond drilling, and developing an auriferous mispickel deposit, on the Nora and adjoining claims.

CHEMUNG COPPER CO.

NEW MEXICO

James Wanless, receiver. Bought out, Aug. 18, 1912, by Phelps, Dodge & Co., and in process of dissolution, paying shareholders \$1,381,072, or \$6.16 per share.

CHENOWITH BROS.**MEXICO**

Address: Nogales, Santa Cruz Co., Ariz. Owns the Josefina copper mine, near Santa Cruz station, on the Sonora-Cananea branch of the S. P. R. R. of Mexico.

CHEROKEE COPPER CO.**MICHIGAN**

Idle. Office: Houghton, Mich. Mine office: Lake Mine, Ontonagon Co., Mich. W. A. Hodgson, pres.; Linus Stannard, first vice-pres.; Deen L. Robinson, second vice-pres.; Wm. D. Calverly, sec.-treas.; preceding officers. J. H. Rice, B. M. Chynoweth and R. M. Edwards, directors; Herman W. Fesing, supt. Organized April, 1910, under laws of Michigan, capitalization \$2,500,000, shares \$25 par; issued, \$1,750,000, of which 49,000 shares were given for lands, 5,000 shares went to the promoters, and 16,000 shares were sold to the public at \$5.

Lands, 800 acres, being Sec. 2 and S. E. $\frac{1}{4}$ of Sec. 3, T. 51 N., R. 57 W. Lands, lying between the Bohemia and King Philip, 1 to 2 miles southwest of the latter, formerly were owned by the Penn Mining Co., and later by the ill-starred Belt Mines Co., Ltd. Property, entirely on the mineral belt, formerly included what is now the Lake mine of the Lake Copper Co., and carries upwards of a mile of the copper-bearing formation, presumably carrying the Evergreen belt. There are old shafts of 70' and 90', and a little work was done thereon 1902. Present work is by diamond drilling, begun in the southeast, working backwards to the northwestern part of the tract. No. 6 drill hole cut a cupriferous amygdaloidal bed of 32' width, of which 5' carried good copper.

CHERRY CREEK MINES CO.**ARIZONA**

Idle. Mine office: Cherry, Yavapai Co., Ariz. H. A. Ingalls, supt., at last accounts. Main shaft, 115', shows a vein with a 3' paystreak giving assays of about 12.5% copper, 4 oz. silver and \$9.60 gold per ton.

CHESHNINA MINES COPPER CO., INC.**ALASKA**

Office: 2026 Colby Ave., Everett, Wash. C. E. Russell, pres. and treas.; Ella M. Russell, sec. and Bethelen von Zeipel, mgr., at last accounts. Organized 1912, capitalization \$1,000,000. Property is said to be located at Cheshnina river, Alaska. No trace of operations secured. Not regarded favorably.

CHESTATEE MINE.**GEORGIA**

Idle many years. Property, 6 miles from Villa Rica, has a bedded vein of cupriferous pyrite of 22 to 30' width, with paystreaks on either wall, outcrops being traceable 2,000'. Ore is said to average 3%, but probably averages about 1.5% in copper tenor only. Deserves prospecting.

CHESTERFIELD COPPER CO.**ARIZONA**

Office: 410 Brown Bros. Bank Bldg., Philadelphia, Pa. Mine office: Twin Buttes, Pima Co., Ariz. H. N. Brown, pres.; J. W. Thompson, vice-pres.; C. E. Horney, sec.-treas.; preceding officers, T. C. Cary, Thos W. Jackson, Thos. Irving, Jessie Pinder, J. W. Stone and T. P. Fisher, directors; E. A. Pike, gen. mgr. Organized April 8, 1907, under laws of Arizona, capitalization \$3,500,000, shares \$1 par; \$2,975,101 issued. Annual meeting, second Saturday in April. Authorized, 1912, a \$150,000 3-year 7% bond issue. General balance sheet, March 31, 1913, showed: Cash and accounts receivable, \$1,731; machinery, supplies, etc., \$7,387; bonds and stock in treasury, \$463,035. Current liabilities, \$13,095; other liabilities, \$4,422.

Lands, 34 claims, area 680 acres, including the Tiger and Crown King groups, 5 miles from Twin Buttes, developed by the 487' Crown King shaft, showing pockets of galena. The 197' Tiger No. 11 incline shaft is sunk on a fissure vein, carrying galena, with a shoot of silver-lead ore assaying about 20 oz. silver and the Esperanza shaft was 700' deep, April, 1913. Ten

pits show copper sulphides, and there are tunnels of 40', 63', 110' and 296'. Equipment includes 9-h. p. and 25-h. p. gasoline hoists. Produced 84,591 lbs. fine copper in 1911, of which amount 54,591 lbs. was from ore smelted.

Property is not without merit, but certain advertising, apparently inspired by the management, is not favorably regarded. In Aug., 1913, mine was shut down and reported as about to be sold to satisfy creditors.

CHETICAMP COPPER CO., LTD.

NOVA SCOTIA

Idle. Office: 37 Sackville St., Halifax, N. S. Mine office: Cheticamp, Inverness Co., N. S. Edward Staris, pres.; John W. Regan, sec.-treas.; Milton V. Grandin, supt., at last accounts. Organized May, 1904, under laws of Nova Scotia, capitalization \$3,000,000, shares \$1 par, as a merger of the Eastern National Copper Co., Ltd., and 3 other corporations.

Lands, 950 acres, freehold, also a 200-acre mill and smelter site, 1,000 acres timber lands, and 200 acres water frontage, with a government license for exploring and locating mines on 50 sq. miles.

Property shows a mineralized zone, in micaceous schist, of 350' width, traceable $1\frac{1}{2}$ miles, carrying 4 orebodies, of which 3 are developed by a 200' shaft and by tunnels of 25', 35' and 115', claimed by company to show 250,000 tons of exclusively sulphide ore, averaging 2.5 to 3.5% copper, 18% lead, 30 oz. silver and \$2 to \$30 gold per ton. Nearest railroad is 38 miles, but mine is 5 to 6 miles only from tidewater. Property considered promising, though estimates of tonnage and values are excessive.

CHETKO COPPER CO.

OREGON

Idle. Office: Ashland, Ore. Mine near Kerby, Josephine Co., Ore. C. W. Evans, pres. and gen. mgr.; C. C. Hicks, vice-pres. and supt.; A. E. Shepard, sec.-treas.; J. M. Keith, mine supt., at last accounts. Organized Aug. 10, 1905, under laws of Arizona, capitalization \$1,000,000, shares \$1 par; issued, \$730,516.

Lands, 36 claims, area 720 acres, fairly timbered, and 2 water rights, all in Curry county, Oregon, about 70 miles from Grant's Pass, the nearest railroad point. Property is said to show 8 orebodies, with 2 under development, 1 reported by company as of 240' average width, traceable $1\frac{1}{4}$ miles, carrying native copper in schist, also covellite, bornite and chalcopyrite, claimed by company as of 9% average copper tenor, with \$4.75 gold per ton. Development is by shafts of 45', 34' and 80', and by 6 tunnels, of 30 to 230' length, with 969' of workings, estimated by company to show 600,000 tons of ore, with 115,000 tons blocked out for stoping, all of which figures are regarded as excessive.

CHEWELAH COPPER KING MINING CO.

WASHINGTON

Office: 115 Wall St., Spokane, Wash. Mine office: Chewelah, Stevens Co., Wash. S. P. Domer, pres. and gen. mgr.; H. H. Hebert, vice-pres.; E. W. Shively, sec.-treas.; preceding officers, J. Grier Long and W. W. Dickson, directors. Organized 1898, under laws of Washington, capitalization \$100,000, shares 10 cts. par, changed 1909, to \$1,000,000, shares \$1 par, and increased, March, 1912, to \$1,250,000; issued 1,136,230 shares. Bonds, \$30,000 authorized at 8%; issued, \$10,360. Annual meeting, third Thursday in May. Company negotiating for sale of property to Granby Consolidated M. & S. Co., Aug., 1913.

Lands, 4 claims, 1 fractional, area 47 acres, patented, and a 3-acre mill site, with 80 acres miscellaneous lands, 6 miles east of Chewelah, showing 4 orebodies, estimated widths of 8 to 56', carrying mainly chalcopyrite and gray copper, both argentiferous and auriferous, with estimated values of 3 to 5% copper, 2 to 6 oz. silver and \$1 to \$2 gold per ton. Development is by a 300' shaft, and tunnels of 1,200' and 1,350', estimated by management to

show 300,000 tons of ore. Shipments to the Granby smelter, 1913, returned 8.65% copper and 41.6 oz. silver per ton.

CHEWELAH COPPER MINING & SMELTING CO. WASHINGTON

Idle. Mine office: Chewelah, Stevens Co., Wash. W. H. Brownlow, pres.; R. A. Gage, vice-pres.; J. R. Pritchard, sec.; Geo. H. McCrea, treas.; preceding officers, J. R. Giles and A. H. Anderson, directors, at last accounts. Lands, 7 claims, 2 fractional, known as the Alberta group, opened by incline shafts of 50' and 100', showing sulphide ore reported to average 2.5% copper, 2 oz. silver and \$5 gold per ton. Mine is wet. Equipment includes a 250-h. p. steam plant, and an air compressor. Feb., 1909, company was trying to raise money to install a smelter, planned to be built in two 50-ton units, at estimated cost of \$25,000. No recent returns secured.

CHICAGO COPPER MINING CO.

NEW MEXICO

Idle. Office and mine: Oscuro, Lincoln Co., N. M. E. G. Rafferty, pres., treas. and gen. mgr.; H. H. Miller, vice-pres.; H. E. Riddle, sec.; preceding officers, H. R. Rafferty and M. Loquis, directors. Organized Jan. 31, 1906, under laws of New Mexico, capitalization \$1,000,000, shares \$100 par, nonassessable. Lands, 22 claims, unpatented, 18 miles from a railway, in the Oscuro mountains, also real estate in Oscuro. Mine has a 60' shaft, and tunnels of 60', 120', 222' and 1,550', with about 3,000' of workings, from which former owners shipped several carloads of ore, said to have returned \$270 per ton. Has steam power and a 2-drill Sullivan air compressor.

CHICAGO COPPER REFINING CO.

CALIFORNIA

Office: Kesner Bldg., Chicago, Ill. Mine office: Red Bluff, Tehama Co., Cal. Wm. Wrigley, Jr., pres.; A. G. Cox, vice-pres.; N. E. Guyot, sec. and supt.; Edw. Dickinson, treas.; preceding officers and Chas. P. Whitney, directors. Organized Aug., 1908, under laws of Wyoming, capitalization \$2,000,000, shares \$5 par, nonassessable. Has no connection with the other Chicago Copper Refining Co., of Illinois.

Property is a 99-year lease on the property of the California & Massachusetts Copper Mines Co. Lands, 72 claims, area 1,600 acres, unpatented, well timbered and watered, on Tom Head mountain, 25 miles west of Red Bluff, known as the Tom Head mine. Property shows schists, cut by rhyolite dikes, carrying 3 veins, with gossans of 90 to 300' width, 1 vein, of 30' estimated average width, carrying chalcopryrite, associated with pyrite, estimated to assay 2 to 3% copper, 0.5 oz. silver and \$1.40 gold per ton. Property formerly was reported to carry bornite and native copper, and No. 3 tunnel is said to have given ore assaying up to 18% copper, with small gold values. Mine has tunnels of 45', 355' and 460', with about 2,000' of workings, estimated by management to show 250,000 tons of ore.

Equipment includes an 80-h. p. steam plant, with a small hoist and 4-drill Sullivan air compressor. Lands carry undeveloped water power estimated at 3,200 h. p. There is a 4,000' sawmill, and 10 buildings. Management is said to plan a smelter. Property, though low in grade, gives evidence of having large orebodies. Superintendent reports, 1913, that "while property is intact and protected, work will not be resumed until Forestry Bureau exactions cease and smoke restrictions are modified so as to permit smelting."

CHICAGO COPPER REFINING CO.

ILLINOIS

Bankrupt. Formerly at Blue Island, Ill. See Vol. X.

CHICAGO EXPLORATION & DEVELOPMENT CO.

MEXICO

Address: Mina Mexico, Sonora, Mex. W. E. Pomeroy, mgr.; Geo. Squire, smelter supt.; Chas. Gercken, mine supt. Property, 45 miles north-east of Tonichi, the end of a branch line of the S. P. de M. R. R. Mines produce silver-copper ore and concentrates.

Smelter, 75 ton capacity, blown in Aug., 1913, with charcoal, to smelt 100 tons of 100 oz. copper concentrate, stored in bins.

CHIEF CONSOLIDATED MINING CO.

UTAH

Office: Houghton, Mich. Wm. P. Seager, sec.-treas. Mine office: Eureka, Juab Co., Utah. Walter Fitch, pres. and gen. mgr.; Cecil A. Fitch, supt.; Walter Fitch, Jr., asst. supt.; Howard Fitch, engr. Other directors are J. H. Rice, W. A. Hodgson, F. W. Denton, Cecil Fitch and D. L. Robinson. Organized Feb. 16, 1909, under laws of Arizona, capitalization \$1,000,000, shares \$1 par, nonassessable; issued, \$876,453. Is controlled through ownership of \$500,000 stock, by American Mines Syndicate. Houghton National Bank, registrar; Boston Safe Deposit & Trust Co., transfer agent. Has about 1,800 shareholders. Stock is listed on the Boston curb. Annual meeting, third Tuesday in February. Has paid total dividends of \$175,290 to end of 1913, initial dividend of 10% being paid in February. Management hopes to make semi-annual disbursement of 10%.

Company controls, through ownership of 95% of stock issue, the Eureka City Mining Co. From organization to Dec. 31, 1912, total receipts were \$1,047,877 and disbursements were \$744,854, company ending the year with \$303,023 cash on hand.

Lands are 20 claims, and company also owns the mineral rights under the city of Eureka, giving a total of 450 acres mining ground. Holdings are contiguous, and lie in the heart of the Tintic mining district.

The lands carry about 4,000' of the strike of the Victoria ore channel, which has an extreme width of about 400', the Victoria ore channel being on the Mammoth-Grand Central ore zone, and parallel to the Centennial-Eureka zone. The Victoria ore channel has a practically N.-S. strike, the ore occurring in pipes and shoots in nearly vertical lime beds.

Mine is opened by an 1,800' vertical shaft with about 20,000' of workings, principal development being on the 1,000', 1,200', 1,400' and 1,600' levels. New openings made during 1912 total 5,576'; ore shipped in this period totaling 30,038 tons, yielding 7,682 oz. gold, 895,885 oz. silver and 817,090 lbs. lead.

The plant has three 150-h. p. boilers, with mechanical stokers, 2 hoists and 15-drill and 10-drill Nordberg air compressors. The double-cylinder hoist has 6' balanced drums, 1½" steel cable, and operates 2 triple-deck cages in balance, carrying 1-ton cars, to depth of one-half mile. Buildings include a power plant, housing the boilers, hoists and air compressors; a machine shop, carpenter shop, and a smithy, all of steel frame, the new buildings and machinery costing \$60,000. Property considered valuable and management excellent.

CHIEF GROUP.

ARIZONA

Office: care Bracy Curtis, owner, Nogales, Ariz. Claims, 1½ miles northeast of the R. R. R. mine, are developed by tunnel showing copper, lead and zinc ore.

CHIHUAHUA COPPER MINING CO.

MEXICO

Office: Bearing Bldg., Saginaw, Mich. B. W. McCausland, pres.; Ross D. McCausland, vice-pres. and gen. mgr.; Norman Rupp, sec.; E. G. Rust, treas.; preceding officers, F. G. Palmerton, Geo. W. McCausland and F. R. Messinger, directors., at last accounts. Organized 1907, under laws of Arizona, capitalization \$1,500,000, shares \$10 par; fully issued. Annual meeting, third Tuesday in February.

Lands, 104 hectares, in the Chorreros, Santa Barbara and Carizalillo districts of Chihuahua. Properties show 3 orebodies, under development, reported as 3 to 8' wide and traceable 4 miles, carrying chalcopyrite, bornite and nickeliferous pyrrhotite ores, averaging 5% copper, 5 oz. silver and 0.6% nickel. The Justicia mine has a 200' shaft, other shafts being the Sidney

of 100', Bronces of 400', and the Carizalillo shafts of 75' and 100', mine having 3,500' of workings, claimed to show 100,000 tons of ore, with 75,000 tons blocked out.

The Hathaway mine, 18 miles south of Santo Domingo and 12 miles south of Falomir station, on the Kansas City, Mexico & Orient railway, has 2 small but persistent veins carrying rich copper sulphides.

Equipment includes a 25-h. p. steam plant, a 120-h. p. Otto suction gas producer, and two 60-h. p. Otto gas engines, also 25-h. p. and 35-h. p. hoists and an 8-drill air compressor.

The concentrator, of about 30 tons daily capacity, built of stone and timber, has a No. 4 Blake crusher and 2 jigs, producing concentrates of about 20% copper tenor.

The Hathaway mine has an old smelter, of antiquated design and equipment, of no value for modern uses.

Company planned sinking 3 new shafts, deepening present shafts, driving a tunnel, building a power plant and concentrator, and possibly a small smelter. In Aug., 1908, was producing about 16 tons daily of concentrates of 15% copper tenor, and expected to reach a daily output of about 40 tons by 1909. Idle several years, on account of Mexican revolution.

CHILE COPPER CO.

NEW YORK

Office: 165 Broadway, New York. Daniel Guggenheim, pres.; Albert C. Burrage, vice-pres.; preceding officers, Murry Guggenheim, Isaac Guggenheim, S. R. Guggenheim, Simon Guggenheim, Pope Yeatman, William Loeb, Jr.; John N. Steele, Albert C. Burrage, Jr., Russell Burrage and William J. Maloney, directors. C. K. Lipman, sec.; L. Friedrich, treas. Organized April 16, 1913, under laws of Delaware, capitalization \$110,000,000, shares \$25 par; issued, 3,800,000; 600,000 shares held in treasury for conversion of \$15,000,000 7% gold bonds. Company owns the entire issued capital stock of the Chile Exploration Co. of New Jersey and its Chilean properties are described under that title in Part III.

CHINA MOUNTAIN COPPER CO.

NEVADA

Office: Hugo, Okla. Mine office: Contact, Elko Co., Nev. W. F. Klitz, supt. Lands, sundry claims, unpatented, at the base of China mountain, slightly prospected, now under development by tunnel.

CHINO COPPER CO.

NEW MEXICO

Office: 25 Broad St., New York. Mine office: Hurley, Grant Co., N. M. Charles M. MacNeill, pres.; Col. Daniel C. Jackling, vice-pres. and gen. mgr.; preceding officers, Charles Hayden, A. Chester Beatty, Berthold Hochschild, Sherwood Aldrich, Spencer Penrose, W. Hinckle Smith and Mark L. Sperry, directors; K. R. Babbitt, sec.; Keith Stewart, treas.; K. R. Babbitt, gen. counsel; John M. Sully, mgr.; Horace Moses, mine supt.; W. H. Janney, mill supt.; R. C. Gemmell, cons. mg. engr.; F. S. Janney, cons. mill engr.; George O. Bradley, cons. mech. engr. Organized Aug., 1909, under laws of Maine, capitalization \$3,500,000, shares \$5 par; increased to \$4,000,000 June 30, 1911; and again increased to \$4,500,000 April 2, 1912; of which 100,000 shares are reserved for conversion of bonds and 30,000 shares remain unissued. Bond issue \$2,500,000, first mortgage 6%, convertible to July 1, 1917, into stock at \$25 per share. Is closely connected in management and ownership with the Utah Copper Co. and Ray Consolidated Copper Co. Annual meeting, third Friday in April. Paid initial dividend of 75 cts. per share, June, 1913, and a second dividend Sept. 9, of like amount.

The company owns and controls 131 claims, 2,412 acres, patented, at Santa Rita, title to which was derived from the Santa Rita Mining Co., since dissolved; also 13 claims, 231 acres, held by location and 160 acres, patented, agricultural land, making a total at Santa Rita of 2,803 acres.

Area of lands owned and controlled at Hurley for mill site and water rights is 7,997 acres, 6,600 acres being owned outright and the remainder leased from the state and individuals.

The property is the old Santa Rita del Cobre mine, which is the oldest copper mine in New Mexico, and one of the oldest in the United States, having been opened, 1804, by Spaniards, and worked 1828-35 by a Frenchman who was reported to have made net profits of \$500,000 therefrom. In the early days only the rich streaks were mined and ore was sent by pack trains to Mexico. The mine was abandoned, 1820, owing to the Mexican revolution, and reopened 1828, closed down 1835, and again reopened 1860, since which time it has been a spasmodic producer.

The property occupies a basin at the foot of the Santa Rita mountains, showing quartz-diorite and andesite-porphyry. Diorite forms practically all of the rim of the basin on the east, north and west, dipping in a generally southeastern direction, under the extrusive flows constituting the south and southeast rims. The sedimentaries consist of a quartzite bed, overlying a series of impure limestones. The andesite-porphyry, a later intrusion, cuts both diorite and the sedimentaries, the orebodies being associated with andesite-porphyry. Both intrusives and sedimentaries are much shattered, giving ideal conditions for secondary enrichment.

The old workings, very irregular, have considerable high-grade ore developed and include No. 8 shaft, 214' deep, with 2 compartments; the 300' two-compartment No. 9 shaft; the 300' No. 7 shaft, showing ore ranging from chalcocite and native copper to low-grade sulphides, principal values being developed in the latter, but having a considerable amount of high-grade ore to serve as a sweetener for the low-grade disseminated ore.

The ore deposit is a belt of horseshoe form, some 7,000' in length, with average width of about 500', carrying disseminated ores in the shattered country rock near the intrusives, ore being mainly disseminated sulphides, largely chalcocite, with some native copper, in andesite-porphyry and quartzite. Property is being proven by churn-drilling, about 8 holes to the acre, checkerboard fashion, holes averaging about 385' in depth, and occasionally being much deeper, ore proven as a rule being low in grade, with occasional streaks of high-grade ore. The disseminated ore of commercial grade runs much deeper than in other porphyry mines developed so far, ore having been found to a depth of 1,600' by borings in the Hearst-Carasco section. The mine was estimated Jan. 1, 1913, to have about 90,000,000 tons of ore developed, averaging slightly in excess of 1.8% copper, about 90% being available for open-pit mining by steam shovels. About 500 acres have been prospected, more or less thoroughly, with strong chances of considerable ore remaining in the unexplored portions of the territory.

Practically all of the present tonnage is being taken in nearly equal proportions from what are known as the Romero-Texas, Flat-Whim Hill and Hearst orebodies, which are composed of the component ore zones described in Vol. X.

The mine has 16,000-ton ore bins and electric power is used mainly. There are 7 steam shovels, 15 locomotives and about 100 dump cars. For breaking ground, holes averaging about 30' deep are bored by Cyclone drills and charged fired by blasting machines.

The concentrating mill is at Hurley, 9 miles from the mine, on the Santa Rita branch of the Santa Fe railway. Originally planned for three 1,000-ton units, 2 more were added during the construction and the mill now has a nominal capacity of 5,000 tons per day. The first unit went into operation in Oct., 1911, and ore was running through the 5th and last section on Nov. 28, 1912. Five sections are now completed, but only 4 have

been running at any one time, due to taking out of operation successively the first 3 sections for slight alterations to conform to improvements made into the last 2 units.

The plan of the mill is essentially the same as that of the mill of the Utah Copper Co., and equipment of the first 3 sections includes 1 set of 72x20" rolls, 6 sets of 16x42" rolls, 9 large Garfield Chilean mills, 9 smaller Garfield Chilean mills, 6 sets of Garfield jigs, 24 Garfield tables, 18 Wilfley tables and 450 Frue vanners. Equipment for the 4th and 5th sections is practically identical. The power plant includes three 1,250-kw. generators, direct-driven by three 1,250-h. p. Corliss engines. Water is secured from the underflow along the Lone Mountain draw, with an 85x200' reservoir near Apache Tejo, and with available water on Whiskey and Cameron creeks. The company is said to also plan developing another water supply on the Central City draw, 8 to 10 miles from the mill, pumping water therefrom into a central station and thence to the Apache Tejo reservoir.

The town site at the mill includes an office building, store, shops and dwellings. There is also a town built up around the mines.

Production in 1912 was 29,237,966 gross lbs. of copper from 1,120,375 tons of ore of an average grade of 2.077% copper. The cost per lb. of copper for the year, without crediting miscellaneous income, was 7.69 cts. per lb. The average grade of concentrates was 21.20% copper, reducing 16.56 tons of ore into 1 of concentrates, with a recovery of values at the mill of 61.63%, which will probably be considerably higher after the more oxidized ores, which very largely entered into 1912 output, are all mined. During the greater part of 1912 only 3 sections of the mill were in operation, with 4 sections operating from September to December, both inclusive. The output for the first 8 months of 1913 has been 34,858,746 lbs. fine copper, with an average production of about 4,000,000 lbs. per month and an August record of 6,050,867 lbs. From the present rate of production, operating only 4 sections of the mill, it is estimated that the property is capable of producing 60,000,000 to 65,000,000 gross lbs. of copper per year with the mill at maximum capacity. Results for 1912, the first full year of Chino's operating history, have amply fulfilled expectations and prove that Chino, with its present developed tonnage, will for a great many years be in the forefront of the large low-cost producers among the so-called porphyries.

CHIRIPA y ANEXAS; MINAS LA.

MEXICO

Mine office: Zimapán, Hidalgo, Mex. Leon Lamaire y Ca., owners. Properties are: La Chiripa, La Pretoria, La Mutua and El Moro mines, carrying argentiferous lead and copper ores, and there is a small smelter. Employed about 50 men at last accounts, 1911.

CHISNA CONSOLIDATED MINES CO.

ALASKA

Office: 263 La Salle St., Chicago. Mine office: Landlock, Alaska. E. Meers, pres.; Jos. Kreis, vice-pres. and gen. mgr.; Chas. Kreis, sec.-treas.; Dr. E. T. Griffith, supt.; preceding officers, J. F. Quinn, Jas. Shaka and A. B. L. Gellermann, directors. Organized April, 1906, under laws of Washington, as successor of Central Alaska Gold & Copper Co., capitalization \$5,000,000, shares \$1 par, nonassessable; issued, \$3,500,000, in 1911.

Lands are 42 claims, patented, in 4 groups, on Landlock bay, near Valdez. The Steinmetz group has a 50' shaft, formerly reported to be in a vein 150' wide, averaging 7% copper, and now claimed to be 225' wide, 4,500' long, and to carry chalcopryite averaging 5% copper, 4 oz. silver and \$1.66 gold per ton, which figures are considered exaggerated. Ore is highly silicious, and development is mainly opencast.

Equipment includes a Pelton wheel, direct-connected to a 60-h. p. dynamo, and a small hoist. There are several buildings and a small saw-

mill, also having a Pelton wheel. Company, 1913, reported out of funds and outlook gloomy, but property is not without promise.

CHOIX CONSOLIDATED MINING CO., LTD.**MEXICO**

Office: 516 Grant Bldg., Los Angeles, Cal. Mine office: Choix, Sinaloa, Mex. R. A. Thomas, pres.; A. E. Pomeroy, first vice-pres.; C. J. Heyler, second vice-pres.; J. R. Thomas, sec.; A. M. McDermott, supt.; preceding officers, Leslie F. Gay, W. W. Thomas and W. B. Simmons, directors. Organized May, 1902, under laws of Arizona, capitalization \$5,000,000, shares \$1 par, nonassessable; issued, \$3,155,534. Is protocolized under laws of Mexico. Owns 45% of the stock issue of Los Platanos Development Co. Annual meeting, first Monday in October.

Lands, 453 hectares, and a 500-acre smelter site, some distance from a railway, on both sides of the Rio Fuerte, in El Fuerte district of Sinaloa and Urique district of Chihuahua. Orebodies are claimed to measure 50 to 300' in width, occurring as contact deposits between diorite and limestone, with fissure veins in granite and quartzite carrying gold and silver. Property includes several antiguas.

Shipments 1900-02, of 1,062 tons of ore, to the Aguascalientes smelter, gave returns of 19.5 to 28% copper, with gross values of \$127,915.44 and net values of \$47,940.61.

A smelting plant of 100 tons daily capacity, purchased 1911, has been received, but not installed owing to revolutionary disturbances in Mexico.

CHOLONA COPPER CO.**NEVADA**

Mine in Humboldt Co., Nev. J. P. Olsen, gen. mgr. Reported to show oxide ore from which shipments are being made. Development by various old workings with 65' winze said to be in ore. A new 2-compartment shaft, now 50' deep, is to be sunk to 200' and a drift at 50' is developing an oxide seam. Mine has been working since June, 1913.

CHRISMAN & GLOBE MINING CO.**ARIZONA**

Mine office: Globe, Gila Co., Ariz. Isaac Chrisman, pres. and gen. mgr. Lands are variously reported as 7 claims and as 25 claims, northeast of the Arizona & Michigan and one-half mile east of the Superior & Globe. Property includes a mine location known as Cameron, with about 15 buildings. Mine has a tunnel, showing ore carrying a little copper, with good silver values. Property was under development, by lessees, 1910. Presumably idle.

CIENEGUITA CONSOLIDATED MINES.**MEXICO**

Office: 25 Broad St., New York. Is a reorganization of the Cieneguita Copper and Cieneguita Securities companies. James F. Whitney, pres.; Frank Fritz, vice-pres.; R. C. Davenport, sec.; preceding officers, Theodore Martin, Geo. D. Christy, R. W. Campbell and David Angus, directors.

Property, 1,100 hectares, about 40 miles southwest of Sahuaripa, Sonora, is covered by rhyolitic rocks, mostly fragmental and cut by a diabase dike. The Chipiona and the Cargona groups lie close together and the Ostimuri-Tayapa group about 2 miles to the southeast. The rocks are cut by vertical veins, 1 reported to be from 3 to 50' wide, traceable 3 miles and to carry ore shoots averaging about 2½% copper and 40 oz. in silver.

Development mainly by tunnels, one of 1,200' with 2 shallow shafts and a total of about 3 miles of workings. These workings are not sufficient to block out any large amount of ore, but show that the property has merit and may develop into a large mine.

Equipment includes 100-h. p. steam plant, a 6-drill compressor and all necessary mine buildings and houses for employees.

A small smelter has Blake crushers and rolls, a 75-ton calcining fur-

nance and two 50-ton reverberatory furnaces, burning wood. Smelting plant inadequate and poorly adapted for the ore.

The past history of the company has been decidedly crooked, and, coupled with poor transportation and lack of developed ore, caused the old company to go into bankruptcy. The relationship of the 3 old companies is fully discussed, Vol. X. The new company starts out with a good board and has the advice of a competent engineer, Frank H. Probert, which, if followed, should bring the company to a profitable stage.

CIMARRON MOUNTAIN MINING CO.

NEW MEXICO

Idle. Office: 13 Dodge Blk., Lansing, Mich. Mine office: Cimarron, Colfax Co., N. M. Hon. Justus S. Stearns, pres.; C. C. Hopkins, vice-pres.; F. S. Porter, sec.-treas. Organized Oct. 24, 1904, under laws of New Mexico, as successor of Consolidated Verde Mining & Milling Co., capitalization \$2,000,000, shares \$1 par; issued, \$1,800,000.

Lands, 65 acres, patented, in the Cimarron district of the Maxwell land grant, 35 miles from Springer, the nearest railroad station, with good wagon road connecting. Claims show gossan of limonite and honeycomb quartz carrying gold values and copper stains. Has 1,500' of workings, mainly tunnels. Practically no work has been done by present company, and property has been shut down since 1905.

CINCO DE MAYO MINING & SMELTING CO.

MEXICO

Idle. Office: San Antonio, Tex. Mine near Descubridora, Mapimi, Durango, Mex. Alfred Van der Stucken, pres.; E. Harms, vice-pres. and gen. mgr.; G. C. Carothers, sec.; Douglas Muir, gen. mgr.; Geo. B. Smith, supt., at last accounts.

Lands include the Parandera and Mimbres mines, both copper properties, the former having 100' and 300' shafts, developing high-grade oxidized copper ores, estimated to average 8% in a limestone-porphry contact. To Feb., 1908, company had shipped 50 carloads of ore, from development work, to the Torreón smelter, which was said to have paid costs.

CITY ROCKS MINING CO.

UTAH

Office: Leopold Bldg., Houghton, Mich. N. W. Haire, pres.; John Edwards, vice-pres.; Jas. P. Edwards, sec.-treas.; W. S. Zehring and Jos. Bosch, directors. Organized 1906, under laws of Utah, capitalization \$1,000,000, shares \$5 par. Has an issue of convertible bonds. Property consists of shareholdings in the Michigan-Utah Mining Co., received for lands sold in 1912.

CLARA BARTON MINE.

MONTANA

Mine office: Delpine, Meagher Co., Mont. S. Southworth, mgr., at last accounts. The mine, at Spring creek, 20 miles from the Chicago, Milwaukee & Puget Sound railroad, has a 400' shaft, with stoping in progress on the 400' level. Mine shipped chalcopryite ore averaging about 20% copper, after sorting, a distance of 20 miles to the railway a few years ago. Is inactive, awaiting transportation facilities.

CLARA CONS. GOLD & COPPER MG. CO.

ARIZONA

Declared bankrupt, Jan. 27, 1912. Reorganized as the Swansea Consolidated Gold & Copper Mining Co., receiving 1,500,000 shares of the total of 4,000,000 shares for the transfer of the property with its indebtedness and liabilities. A suit was filed against the Clara Consolidated in Oct., 1912, by George Mitchell, former president, for \$75,000, and by Mary Mitchell for ejectment from several mining claims valued at \$25,000 and the recovery of \$200 a month rental therefrom. At last accounts, this suit had not been settled.

CLARK MINE.

MICHIGAN

Idle. Office: care Dr. Léon Estivant, owner, 47 Ave. de l'Alma,

Paris, France. Mine office: Copper Falls, Keweenaw Co., Mich. Fred W. Nichols, agt. Lands, 2,433 acres, including mines formerly known as the Clark, Bell and Montreal, lying about 3 miles south of Copper Harbor, between Lake Fannie Hooe on the north and Breakfast lake on the south, including Lake Manganese. Mine, opened 1858, for copper, had a 16-stamp gravity mill, built 1874, run by water power from Lake Manganese, mill now being dismantled. Property also carries a promising 2' vein of pyrolusite, average of assays, 1900, by Duparc, of Geneva, giving 55.73% manganese and 1.36% copper. Has shipped about 1,200 tons of high-grade manganese ore. Was tested, 1905, and again, 1910, by diamond drills. Was under option, 1910, to United States Smelting, Refining & Mining Co. Fully described Vol. II.

CLARK & TAYLOR GROUP.**ARIZONA**

Property, near Globe, Ariz., comprises about 400 acres, under option, 1913, to Arizona Commercial Copper Co.

CLAYTON MINING & SMELTING CO.**IDAHO**

Idle. Mine office: Clayton, Custer Co., Idaho. Laurence Green, gen. mgr., at last accounts. Lands, 18 claims, showing argentiferous copper and lead ores. Has water power and a smelter rated at 50 tons. Shut down several years.

CLEARWATER GOLD & COPPER MINING CO.**IDAHO**

Office: Wallace, Idaho. Mine office: Clearwater, Shoshone Co., Idaho. Samuel Seidenfeld, mgr.; Dennis Reardan, supt. Organized 1907, under laws of Idaho, capitalization \$2,500,000, shares \$5 par. Lands, 12 claims, including the Cunningham group, on the north fork of the Clearwater river, 20 miles south of Wallace, nearest rail point, with a wagon road connecting. Property shows a vein said to be traceable 5 miles, 1 mile on company's lands, carrying oxidized ores near surface, with chalcopyrite and chalcocite at depth, giving assays of 5 to 15% copper and 3 to 20 oz. silver per ton. Development is by 3 tunnels, lower tunnel, 1,400' long, cutting the ledge 1,500' below surface. This work is reported to have developed 300,000 tons of 5% ore carrying \$2 gold and 3 oz. silver per ton.

Equipment includes a hoist and air compressor.

CLEOPATRA COPPER CO.**ARIZONA**

Office and mine: Jerome, Yavapai Co., Ariz. Hon. Geo. W. Hull, pres., treas. and gen. mgr.; Mary A. Hull, sec.; H. M. Pender, supt. Organized 1902, under laws of Arizona, capitalization \$4,000,000, shares \$1 par. Property under bond and lease, 1913, to Frederick S. Stephen, of Glasgow, Scotland, and associates, who will reorganize company and develop mine.

Lands, 13 claims, 11 patented, area about 200 acres, shortly south of the United Verde, showing fissure and gash veins carrying ores assaying 1 to 65% copper and 1 to 500 oz. silver per ton, with fair gold values. Has 6 shafts, of 25 to 150' depth, and 9 tunnels, the Dillon tunnel, of 3,200' length, planned to connect with the "1888" shaft, showing a 3' vein of argentiferous and auriferous copper sulphide, of good average tenor. The Dillon tunnel passes through the Cleopatra into lands of the Hull Copper Co., and latter has permission to use the tunnel through the Cleopatra tract. Some good ore has been taken from crosscuts driven from the Dillon tunnel, but apparently no commercial orebodies have been developed thereby. New work, April, 1913, in an open cut on the top of the mountain is reported to have exposed 30' of commercial ore.

Equipment includes a steam and electric plant, with a 30-h. p. electric hoist and 12-drill air compressor. A 50-ton smelter, built 1906, was not blown in, management stating, on account of lack of iron fluxes.

CLEOPATRA GROUP.**OREGON & CALIFORNIA**

Property, near Galice, Josephine Co., Ore., and sundry claims in Del Norte Co., Cal., comprises 45 claims and a 40-acre mill site. F. H. Osgood and Col. J. S. Crawford, owners. Lands are in an isolated district, difficult of access, and only slightly developed, showing auriferous and argentiferous copper ore, and native copper in masses up to several hundred-weights.

CLEVELAND GROUP OF MINES & MILL.**NEW MEXICO**

Office: care Geo. H. Utter, owner, Silver City, N. M. Lands, 6 claims, area 120 acres, patented, and a mill site, 8 miles north of Silver City, on the west slope of the Pinos Altos mountains, show limestone cut by intrusive dikes of diorite and andesite. Ore occurs in bedding planes in the limestone, varies from a foot or two up to 50' in thickness, with a generally northeast strike and a dip of 15°.

Development is by several tunnels and pits, exposing copper carbonates and oxides, carrying up to 6% copper, 20% zinc, 3 oz. silver and \$1 gold per ton, ores being complex and highly zinciferous. The mine has about 2,000' of workings, and is said to show 200,000 tons ore developed.

Equipment includes a 50-ton concentrating plant, installed 1911.

CLEVELAND MINING CO.**UTAH**

Idle. Office: 409 Hooper Bldg., Salt Lake City, Utah. Mine office: Eureka, Juab Co., Utah. Samuel McIntyre, Jr., pres.; Samuel McIntyre, Sr., vice-pres. and treas.; R. M. Wilkinson, sec. Organized Jan. 12, 1892, under laws of Utah, capitalization \$500,000. shares \$5 par. fully issued. Is controlled, through stock ownership, by Mammoth Mining Co. Lands, 3 claims, patented, showing auriferous and argentiferous lead and copper ores, very slightly developed.

CLIFF COPPER MINE.**ALASKA**

Near Valdez, Alaska. Was operated and shipments made during 1912. Developed to 500' depth.

CLIFF MINING CO.**MICHIGAN**

Office: 12 Ashburton Place, Boston, Mass. Operating office: Calumet, Mich. Mine office: Phoenix, Keweenaw Co., Mich. Rodolphe L. Agassiz, pres.; Quincy A. Shaw, vice-pres.; Geo. A. Flagg, sec.-treas.; Jas. MacNaughton, gen. mgr.; preceding officers, Francis L. Higginson, Francis W. Hunnewell, Thos. N. Perkins and Clarence H. Bissell, directors. Organized Jan., 1910, under laws of Michigan, capitalization \$2,500,000, shares \$25 par; issued, \$1,500,000, \$13 paid in. Is controlled through ownership of 19,400 shares, by Calumet & Hecla Mining Co. Ended 1912 with \$63,074 cash, and accounts payable of only \$1,046. State Street Trust Co., Boston, registrar; American Trust Co., Boston, transfer agent. Annual meeting, first Saturday in May. Company's report for 6 months ending June 30, 1913, shows expenditures of \$9,375; balance of interest receipts of \$965, leaving net expenditures, \$8,410. Balance of assets, \$54,161, against \$62,571 on Dec. 31, 1912.

Lands include the Cliff mine proper, and the South Cliff, connected underground on the 3d level. The Cliff mine, 2 miles northeast of the Ojibway, is the oldest mine in the Lake Superior district, having been opened 1846, closed 1870, again reopened 1872, and abandoned 1878, paying dividends, 1849-79, of \$2,518.620. The old mine was opened on a fissure vein crossing the bedded formation at practically right angles, and was pretty thoroughly worked out before the property was abandoned. The main fissure vein of the old mine had several feeders, and a number of independent fissure veins, including the West vein, which was rich in copper near

surface, and the East Cliff vein, about an eighth of a mile east of the main vein. The old Cliff was notably rich in native silver.

The Cliff carries the Kearsarge amygdaloidal bed for about 2 miles, and for practically unlimited depth, the shaft being a trifle less than 2 miles from the most northerly shaft of the Ojibway, which is the nearest opening on the Kearsarge lode. The Tamarack Mining Co., which owned the Cliff until 1910, secured a complete geological cross-section of the tract, by diamond drilling, 1903-07, the Kearsarge bed being located by 12 drill holes, the majority of which were said to show commercial values, and, in addition, the property carries about 20 other amygdaloidal beds, under the greenstone bluff, which is such a prominent feature of the landscape, rising to a height of several hundred feet. A temporary vertical shaft, with a single compartment, started Aug., 1910, was 217' deep, July, 1913, entering the bed near the hanging wall of the Kearsarge, the ground being considerably disturbed at this point. Work in this shaft was abandoned during the first half of 1913, as the Kearsarge vein at this place proved narrow, dry and barren. A contract has been let to drill the beds eastward in the hope of finding a profitable vein towards the Eastern sandstone.

The Cliff was the first mine ever opened on native copper, and production, 1845, was 19,903 lbs., which was the first commercial output of copper from Lake Superior. Total production, 1845-82, was 38,054,340 lbs. fine copper.

The old waste burrows of the Cliff, which are extensive, were leased, on royalty, to Henry Warren, who built an 8-stamp gravity mill, but failed to make the venture pay.

Buildings include a power house, with boilers, duplex hoist, and a 5-drill air compressor. Other buildings are a smithy, changing house, combination office and warehouse, boarding house and a number of dwellings. The mine is reached by the Keweenaw Central railway.

CLIFTON COPPER BELT MINING CO.

UTAH

Idle. Office: 24-26 West Second So. St., Salt Lake City, Utah. Mine office: Callao, Juab Co., Utah. Clyde H. Wilson, pres.; Frank L. Wilson, sec.-treas. and gen. mgr. Capitalization \$25,000, shares 5 cts. par. Lands, in the Deep Creek district, are traversed by a big porphyry dike, in which a shaft is sinking, showing argentiferous galena assaying up to 34.4 oz. silver per ton. Property carries several veins of argentiferous copper and lead ores, with quartz gangue, and has secured ore assaying up to 35.5% copper, 9 oz. silver and \$1.20 gold per ton. Property also shows ore carrying nickel, tin and bismuth, values of property as a whole apparently being mainly in silver-lead and auriferous bismuth.

CLIFTON GOLD & COPPER CO.

ARIZONA

Idle. Office and mine: Clifton, Greenlee Co., Ariz. A. S. Rosecrans, mgr., at last accounts; LaMar Cobb, cons. engr. Organized Aug., 1907. Lands include the Oregon group, having a shaft showing ore of 5 to 8% copper tenor, on the 150' level.

CLIMAX GROUP MINING CO.

WASHINGTON

Idle. Office: Spokane, Wash. Mine near Baring, King Co., Wash. J. J. Browne, pres.; J. W. Douglas, vice-pres.; Frank P. Smith, gen. mgr., at last accounts. Organized under laws of Washington, capitalization \$1,500,000, shares \$1 par. Lands, 9 claims, area 180 acres, also a 20-acre mill site, in the Index district. Country rocks are granite and diorite, showing several contact veins, of which 2 are developed by a 37' shaft, 2 short tunnels and a 345' tunnel not yet in ore. Ores are bornite and chalcopyrite, giving assays of 3 to 34% copper, 20 to 70 oz. silver, and from a trace to \$6 gold per ton. Closed down many years.

CLIMAX MINING CO.**COLORADO**

Idle. Mine office: Granite, Chaffee Co., Colo. B. H. Pelton, pres., at last accounts. Property is the Spondulix mine, opened by a shaft showing auriferous and argentiferous copper ore.

COAHUILA MINING & SMELTING CO., LTD.**MEXICO**

Office: 614 Penobscot Bldg., Detroit, Mich. Operating office: Apartado 72, Monterey, N. L., Mex. Mine office: Jimulco, Viesca, Coahuila, Mex. H. T. Ambrose, pres.; Frank J. Llewellyn, vice-pres.; Walter E. Parker, sec. and gen. mgr.; Archibald Cattell, treas.; preceding officers, J. Kirby, Jr., Sidney B. Cohn and C. F. Jennings, directors; J. C. Treadwell, supt.; Alex. McCormick, mine supt.; Harry Reed, mill supt. Organized Jan., 1902, under laws of Mexico, capitalization \$500,000 gold, shares \$1 par, nonassessable; fully issued. Dividends have been as follows: 10% in 1902; 6% in 1904; 29% in 1905; 30% in 1907; 10% in 1909 and 16% in 1910, a total of 101%, or \$505,000. Annual meeting, first Wednesday in February.

Lands include holdings in the Mapimi, Viesca and San Juan de Guadalupe districts. Properties include the Santa Maria, Sultana and other mines at Jimulco, carrying auriferous and argentiferous copper and lead ores, opened by a 700' main shaft, and a 1,000' main tunnel, with steam and electric power. The Alberto mine, in the Mapimi district, was said to have made regular shipments of high-grade ore to the Mapimi smelter, 1910. Apparently the Filipinas group, at San Sostenes, Coyame, Iturbide, Chihuahua, Mex., has been abandoned. A 250-ton smelter, with steam and electric power, connected with the mines by rail, was blown in, early 1903, but has not been operating regularly, and was idle, 1909-13. The revolution in Mexico has practically stopped all mining in Coahuila and mines closed down until peace and safety again prevail.

COAST RANGE COPPER CO.**OREGON**

Office and mine: Roseburg, Douglas Co., Ore. Organized Jan. 16, 1903, by T. R. Sheridan, et al., under laws of Oregon, capitalization \$25,000, shares \$50 par. Idle and apparently no work ever done.

COBRE; COMPAÑIA MINERA EL.**MEXICO**

Idle. Office: Calle de Santa Teresa 6, Mexico, D. F. Mine office: Jungpeo, Zitacuaro, Michoacan, Mex. Alfred Stoffel, pres.; M. Herrle, sec.; E. Albert Armour, treas. Organized March 7, 1907, under laws of Mexico, capitalization 95,000 pesos. Property is El Cobre y Anexas mines, carrying gold, silver and copper ores.

COBRE GOLD MINING CO.**OREGON**

Mine office: Illahe, Curry Co., Ore. Lands, 12 claims, 5 miles south of the Rogue river, having several open cuts and a shallow shaft. Presumably idle.

COBRE GRANDE COPPER CO.**MEXICO**

Office: care S. A. Stemmons, sec., Park Hotel, Dallas, Tex. Mine near Cabulonna station, on the Nacozari railroad, about 18 miles from Douglas, Ariz. George E. Megert, pres.; Jas. W. Crotty, vice-pres.; Sam Dysterbach, treas.; preceding officers, J. I. Nichols, J. H. Whattler and H. P. McKnight, directors. Organized Feb. 1, 1907, under laws of Arizona, capitalization \$3,000,000, shares \$1 par; issued \$1,500,000. Annual meeting, second Thursday in April.

Property, 28 claims, patented, 72 acres, near Fronteras, Arizpe district, Sonora, shows a 3' vein of copper-silver ore, developed by 10 shafts, deepest 165'. Idle since 1912 on account of revolution.

• COBRE GRANDE MINES.**ARIZONA**

Albert S. Cooper, mgr. Wheeler & Shaw, Boston, Mass., owners.

Property, 14 claims, in Clark district, Graham Co., Ariz., 23 miles west of Fort Thomas in the Santa Teresa mountains, developed by open cuts and adit tunnels, is said to show a considerable tonnage of 5% ore. Machinery was to be installed and property developed, 1913. Property was sold for \$100,000, payments by installments for 2 years.

COBRIZA DE COBRE; LA.**MEXICO**

See La Cobriza de Cobre.

COBRIZA y ANEXAS; COMPAÑÍA MINERA LA.**MEXICO**

Mine office: Alamos, Sonora, Mex. D. Manuel Salazar y Perron, pres. and gen. mgr.; Dionisio Acosta, sec. Organized under laws of Mexico, capitalization 250,000 pesos; issued, 24,000 pesos. Lands, 50 hectares, including La Cobriza mine, having a 75-meter main shaft, and a 225-meter main tunnel, showing ore with values mainly in copper. La Continuacion de la Cobriza and La Magdalena are virgin properties. Presumably idle.

COCHISE COPPER CO.**ARIZONA**

Mine near Johnson, Cochise Co., Ariz. Kirk L. Hart, gen. mgr.; Geo. M. Brown, supt., at last accounts. Lands carry the extension of the Peabody mine, lying to the eastward. Mine has a shallow 2-compartment shaft, with 500' of workings, and equipment includes a gas engine. Idle since 1909.

COCHISE DEVELOPMENT CO.**ARIZONA**

Office and mine: Bisbee, Cochise Co., Ariz. Lemuel C. Shattuck, pres.; Chas. L. Jones, vice-pres. and gen. mgr.; T. O. McGrath, sec.; Jos. M. Muheim, treas. Organized Aug. 1, 1905, under laws of Arizona, capitalization \$1,000,000, shares \$10 par, succeeding the Cochise Copper Mining Co. Annual meeting, second Tuesday in January.

Lands, 16 claims, area 176 acres, abutting on the Holbrook mine of the Copper Queen Consolidated, and lying north of the Dividend fault and Dubacher gulch. The mine has a 600' three-compartment shaft, a drift on the 300' level showing small bunches of sulphide ore. Machinery includes a 100-h. p. boiler, a 10x30" first-motion double-drum hoist, good for 1,200', and a 6-drill Sullivan straight-line air compressor. Buildings are an engine house, boiler house, 20x40' carpenter shop, 20x30' smithy, and a coal trestle. Property considered promising for disseminated ore. Idle since 1907.

COCOPAH COPPER CO.**CALIFORNIA**

Office: 1014 Central Bldg., Los Angeles, Cal. Mine and works office: Ivanpah, San Bernardino Co., Cal. Dan. Murphy, pres.; Dr. L. D. Godshall, vice-pres. and gen. mgr.; G. Holterhoff, Jr., sec.-treas.

Lands, on Clear mountain, 20 miles from Ivanpah, the nearest railway point, include the Copper World and Mohawk mines, formerly operated by the Ivanpah Consolidated Smelting Co. The Copper World group shows a broad mineralized zone, up to 300' in width, with a silicious iron outcrop carrying some malachite and occasional oxides. Mine has a 180' vertical shaft, with about one-half mile of workings, on a 5' vein, carrying mainly copper carbonates and oxides, in irregular masses.

The Mohawk mine, 2 miles south of the Copper World, shows a 4' orebody with nearly vertical dip, between a porphyry foot and limestone hanging, similar to that of the Copper World, but carrying more azurite. The Mohawk has several hundred feet of workings, and is idle.

The smelter, at Valley Wells, about 5 miles southwest of the mine, built by the old company, was not a success, slag losses being excessive, giving a production of about \$750,000 worth of copper, produced at a loss. Ore of 6 to 10% copper tenor was hauled by teams to Ivanpah, and shipped to the Needles smelter, when working.

C. O. D. CONSOLIDATED.**NEVADA**

See Goldfield Mines Operating Co. At Goldfield, Esmeralda Co., Nev.

C. O. D. LEASING CO.**NEW MEXICO**

Idle. Office and mine: Lordsburg, Grant Co., N. M. Thos. A. Lister, pres., treas. and gen. mgr. Organized Aug. 13, 1909, under laws of Arizona, capitalization \$1,000,000, shares \$1 par, nonassessable; issued, \$664,700. Annual meeting, first Monday in December.

Property, 2 claims, 40 acres, in the Pyramid district 8 miles south of Lordsburg, developed by 4 pits and a 55' shaft, showing lead and copper oxidized ores.

COEUR D'ALENE CONSOLIDATED MINING CO.**IDAHO**

Idle. Office and mine: Osburn, Shoshone Co., Idaho. Louis Bolduc, pres.; E. M. Cornelius, vice-pres.; C. G. Johnson, sec.; Chas. Williams, treas.; preceding officers and W. G. Parks, directors. Lands, 4 claims, 2 to 3 miles from Wardner, having 500' of tunnels and 200' of crosscuts, developing a vein of 5 to 6' width, carrying copper ore and a little lead. Equipment includes a 2-drill compressor, run by water power from Moon creek.

COEUR D'ALENE NELLIE MINING CO.**IDAHO**

Mine office: Osburn, Shoshone Co., Idaho. E. C. Meiklejohn, manager, at last accounts. Property, developed by tunnels and a 70' shaft, shows a small vein of tetrahedrite ore. Presumably idle.

COEUR D'ALENE PACIFIC MINES CO.**MONTANA**

Idle. Office: 43 Ziegler Blk., Spokane, Wash. Dr. Jas. Sutherland, pres.; E. A. Patrick, vice-pres.; M. N. Stratton, sec.-treas.; preceding officers, J. A. Reinhardt and N. E. Jesseph, directors. Organized under laws of Washington, capitalization \$1,000,000, shares \$1 par, nonassessable. Lands, 2 claims, area 40 acres, near the Silver Cable mine, giving fair surface indications of lead and copper ore, with a short tunnel.

COLCHESTER GOLD & COPPER M. & M. CO.**COLORADO**

Office: Colchester, Ill. Mine office: Salida, Chaffee Co., Colo. M. E. Foster, pres.; T. T. Foster, vice-pres.; Geo. Sullivan, sec.; E. B. Wear, treas.; Thomas Penrose, gen. mgr., at last accounts. Organized May, 1908, under laws of Colorado, capitalization \$500,000, shares \$1 par. Lands, 4 claims and a tunnel site, unpatented, area 200 acres, on Cleora mountain, northeast of Salida. Development includes a 40' incline shaft and a 165' vertical shaft left by former owners, also new tunnels of 55' and 110'. Property shows ore giving assays of \$10 to \$63 per ton in gross values from copper, gold and silver. Idle.

COLDWATER COPPER MINING CO.**COLORADO**

Office: Encampment, Wyo. Mine office: Pearl, Larimer Co., Colo. Z. L. Baldwin, pres.; H. N. Backus, vice-pres.; Walter Phipps, sec.; Burr Lobdell, treas. and gen. mgr. Organized May 18, 1900, under laws of Wyoming, capitalization \$1,000,000, shares \$1 par. Lands, 5 claims, 52 acres, in the Pearl district of Larimer county, Colo. Property, known as the Wolverine mine, has 3 fissure veins in granite and diorite, of which 1, of 20' estimated width, shows oxidized ores and native copper, with sulphides at a little depth, estimated to carry an average of 6% copper and 2.6 oz. silver per ton, opened by shafts of 90' and 170', bottom of principal shaft showing massive chalcocite and a little disseminated chalcopyrite, of high average grade. Has steam power. Idle several years.

COLE DEVELOPMENT CO.**ARIZONA**

Office and mine: Globe, Gila Co., Ariz. P. J. Cole, pres.; P. J. Cole, Jr., sec.-treas. Organized Sept., 1909, under laws of Arizona, with capitalization \$300,000, shares \$1 par; issued, 112,000 shares. Lands, 17 claims, known as the Cole & Goodwin group, 4 claims wide and 4 claims long, extending along Mineral creek, 3 miles west of the Gibson mine and about 10

miles southwest of Miami, the nearest available rail point, and 10 miles northwest of Ray, but is separated from Ray by some extremely rugged country, through which no railway is likely to build within a generation or more. Country rock is Pinal schist, carrying the Cole & Goodwin fault, traceable about $1\frac{1}{2}$ miles, that cuts the schist diagonally. This property carries fissure veins in schist, and also disseminated ores in schist. Development is by the 420' Cole incline shaft, cutting several bodies of low-grade ore, and a 35' vein carrying an 8' paystreak, mainly of bornite, with a little chalcocite, somewhat similar to the ore in the Gibson mine, estimated to average about 8% copper. There also are several short tunnels, showing schist carrying impregnations of disseminated chalcopyrite, there being a 135' crosscut tunnel about one-half mile from the shaft, and a 480' crosscut tunnel, 1,700' west of the shaft, with portal 500' vertically below the collar of the shaft. Equipment includes a 22-h. p. gasoline hoist. Idle since 1910, but plans to resume, 1913. Is a leasors' proposition.

COLEMAN FREE GOLD MINING CO.

COLORADO

Office and mine: Alice, Clear Creek Co., Colo. Wm. Coleman, mgr., at last accounts. Mine, having a 250' tunnel, shows auriferous copper ore. Idle since 1910.

COLLEGE MINE.

ARIZONA

Idle. Mine, 15 miles from Wickenburg, Maricopa Co., Ariz., is opened by an 80' shaft, showing a 20' fissure vein carrying gold and copper ore.

COLONIAL COPPER CO.

ARIZONA

Idle. Office: Chelmsford, Mass. Herbert Moseley, sec.-treas. and gen. mgr.; Geo. H. Morrill, Jr., pres.; Adna T. Denison, vice-pres. Organized April 29, 1910, under laws of Maine, capitalization \$3,000,000, shares \$10 par, non-assessable; issued, \$1,720,000. Was a reconstruction of the Growler Copper Co. Bonds, \$500,000 authorized, at 5%; issued, \$41,000. Annual meeting, first Monday in June.

Lands, 30 claims, 26 patented, area 516 acres, in 2 groups, also a 10-acre mill site, apparently held under bond and lease, in the Growler mountains, 15 miles south of Ajo and about 60 miles southeast of Gila Bend, the nearest rail station. The Copper Hill group, of 18 claims, shows an ore zone up to 300' wide, between diabase and limestone, with a gossan traceable $1\frac{1}{2}$ miles, reported by company to carry 3 veins, of 2 to 7' width, having oxidized ores, silicates, bornite and chalcocite, giving assays of 2 to 46% copper, 1 to 66 oz. silver and 0.12 to 2 oz. gold per ton. Development is by the 100' Daisy shaft, 260' Copper Hill shaft, and 320' Yellow Hammer shaft, and the 185' Copper Hill tunnel, with a total of 1,600' of workings, estimated by management to show about \$1,000,000 worth of ore. The company proposes deepening the main shaft to 600' and building a 100-ton matting furnace. A little ore of good average tenor has been shipped to Douglas.

Equipment includes a 170-h. p. steam plant, with 8-h. p., 26-h. p. and 70-h. p. hoists, and a 2-drill Ingersoll-Rand air compressor. Buildings include assay office and commissary, boarding house and smithy, with 6 tent houses. Property considered promising, but handicapped by very poor transportation facilities.

COLONIAL COPPER CO.

NOVA SCOTIA

Address: care Harman Knapp, Ulman & Tucker, Fidelity Bldg., Baltimore, Md. Mine near Cap d'Or, Cumberland Co., N. S. Receivers were appointed for company in May, 1910, but found no assets as property was covered by a \$300,000 mortgage of Trust Co. of North America. Property passed to bondholders, Nov. 2, 1911, by sale, purchasers being the bond-

holders' committee. The 1,100-acre estate and entire mining and milling equipment, 37 buildings, etc., were sold Sept. 10, 1913, at trustee's sale.

COLONIAL MINING CO.

ARIZONA

Mine office: Ehrenburg, Yuma Co., Ariz. Clifford G. Dennis, manager, at last accounts. Has argentiferous and cupriferous cinnabar, assaying up to 7% copper, 30% mercury and 150 oz. silver per ton. Has gasoline power and a 30-ton Scott furnace. Presumably idle.

COLORADO & CONNECTICUT GOLD MINING CO. COLORADO

Office: Meriden, Conn. Mine office: Lake City, Hinsdale Co., Colo. Geo. S. Wilcox, pres.; Wm. C. Corves, vice-pres.; R. S. Dossin, sec.; B. F. Barnes, treas. Organized 1902, under laws of South Dakota, capitalization \$400,000, shares \$5 par, changed later to \$1,200,000, shares \$1 par. Lands, 3 claims, area 21 acres, known as the Dolly Varden mine, in the Galena district, carrying three 2' fissure veins, opened by a 150' shaft and a 738' tunnel, with 1,900' of workings. Ore is chalcopyrite, tetrahedrite and occasional argentite, giving assays of 9 to 19% copper, with occasional silver values, and test shipments have given returns of 141 to 479 oz. silver and as high as \$11 gold per ton. Company's manager predicts that mine can be made a dividend payer in a year. In Jan., 1913, manager reported Ohio vein under development, showing a narrow paystreak of high-grade ore. The Varden vein will be opened by raise from tunnel to bottom of shaft.

COLORADA; MINA.

MEXICO

Idle. Owned by Don Carlos Yanes, San Javier, Sonora, Mex.

COLORADO; MINA.

MEXICO

Idle many years. Independence Grove, owner. Mine, 12 miles west of Ameca, is opened by a 700' tunnel showing auriferous and argentiferous copper and iron sulphides.

COLORADO MINING CO.

UTAH

Office: Jesse Knight, pres., Knight Bldg., Provo, Utah. Mine in the Tintic district, Utah Co., Utah. J. Wm. Knight, vice-pres.; W. Lester Magnum, sec.-treas.; R. E. Allen and A. M. Knight, directors. Organized 1898, under laws of Utah, capitalization \$200,000, shares 20 cts. par; fully issued. Dividends paid quarterly; \$3,000,000 paid up to 1913.

Property, 11 claims, patented, contains large deposits of low-grade ore carrying copper and silver values. Two orebodies now being developed on the 500' level, which is 200' below the main ore zone of the mine, and east of the old ore channel. The south deposit, 400' north of the Sioux Consolidated line, shows 10 to 15' of commercial ore. Mine now shipping (Sept., 1913) 100 tons a week averaging 15 to 20% copper and 40 to 45 oz. silver.

Property is a famous silver-lead producer, which has in recent years shipped considerable copper ore.

COLORADO MINING LAND & INVESTMENT CO. COLORADO

Idle. Office: Walsenburg, Colo. Mine office: Hillside, Fremont Co., Colo. E. L. Neely, pres. and mgr. Organized 1911, under laws of Colorado, capitalization \$750,000, shares \$1 par.

Lands, 110 acres, owned partly in fee and partly leased, are said to show gold, silver, copper and lead assaying up to \$30 per ton.

COLORADO RIVER COPPER & GOLD MINING CO. NEVADA

Mine office: Las Vegas, Clark Co., Nev. Property is slightly developed by a shaft and 2 short tunnels, showing ore giving good assays in copper and gold. Idle.

COLOWYO DEVELOPMENT CO.

WYOMING

Mine in Mineral Mountain district, southern Carbon Co., Wyo. W. W. Daley, Frank A. Hadsell, of Rawlins; Harry P. Hynds, Pitt Covert, C. W.

Riner and Dr. A. W. Barber, of Cheyenne; J. F. Smith, E. H. Parkinson, W. H. Taylor, of Encampment, Wyo., directors. Organized 1913, under laws of Wyoming, capitalization \$1,000,000, shares \$1 par. Property, the Copper King, Wire Gold and Verde mines, now under development by shaft, 5' of pay ore being reported in the Copper King mine. A tunnel is being driven on the Wire Gold. In addition to the gold and copper properties company owns coal lands in Routt county, Colorado.

COLUMBIA COPPER CO.**NEW MEXICO**

Office: Guaranty Trust Bldg., El Paso, Tex. Mine near Santa Rita, Grant Co., N. M. Martin Fishback, M. E., pres. and gen. mgr.; Samuel W. Biggs, sec.; Eugene E. Neff, treas.; preceding officers, Jas. A. Carroll, Winchester Cooley and Geo. J. Wolfinger, directors; F. O. Wills, mine supt., at last accounts. Organized 1906, under laws of New Mexico, capitalization \$1,000,000, shares \$1 par. Rio Grande Bank & Trust Co., El Paso, registrar. Annual meeting, second Monday in July.

Lands, 35 claims, area 700 acres, in 4 groups. The Gallinas group, 10 claims, 5 patented, 7 miles from Gallinas, in the Gallinas mountains, has a 200' shaft, with 700' of workings, showing argentiferous copper and lead ores.

The Clearwater mine, 4 claims, 2 patented, near Santa Rita, held under a 2-year bond and lease, has a 2-compartment shaft, with 1,000' of workings, showing considerable ore of 4 to 6% copper tenor, and a hoist good for 1,000'.

The Columbia group, 9 claims, in Good Fortune canyon, San Andrés mountains, about 10 miles north of Three rivers, has a 300' tunnel, showing oxidized ores giving average assays of 6.45% copper and 1 oz. silver per ton, and several carloads of ore have been shipped.

The Iron Mask group, 10 claims, in the White mountains, near the Mescalero Indian reservation, shows a limonite gossan, apparently of commercial grade for iron ore, carrying traces of copper and silver.

Mine shipped, 1907, a little ore, from the Santa Rita properties. Idle since 1910.

COLUMBIA COPPER MINING CO.**BRITISH COLUMBIA**

Office: 419 Chamber of Commerce, Spokane, Wash. E. P. Wheeler, pres. and gen. mgr.; W. D. Scott, vice-pres.; R. L. Campbell, sec.; J. L. Spoth, treas.; preceding officers and A. S. De Reimer, directors. Organized Feb., 1903, under laws of Washington, capitalization \$1,000,000, shares \$1 par, in 600,000 shares preferred and 400,000 shares common stock; issued, \$650,000. Annual meeting, second Tuesday in September.

Lands, 4 claims, area 200 acres, well timbered, in the Yale district of British Columbia, showing 2 orebodies, larger of 9' estimated average width, also a low-grade dike of 300' estimated average width, former carrying ore, mainly bornite, estimated by company to average 3% copper and \$1 to \$10 gold per ton. Mine has shafts of 30' and 40', and tunnels 60', 110', 150' and 300', estimated by management to show 50,000 tons of ore, with 10,000 tons blocked out for stoping. About \$15,000 has been expended on the property. Was developing in a leisurely way, 1913.

COLUMBIA COPPER MINING CO.**ONTARIO**

Idle. Office: 510 Chamber of Commerce, Detroit, Mich. Mine office: Parry Sound, Parry Sound district, Ont. Dr. A. H. Côte, pres.; Dean S. Fleming, vice-pres.; S. S. Southerland, sec.; Dr. W. P. Dick, treas.; Alex. Dick, cons. engr. Capitalization \$3,000,000, shares \$1 par, nonassessable. Authorized, 1910, a \$10,000 bond issue. Lands, 200 acres, adjoining the McGowan claim of the Parry Sound Copper Co., 1 to 2 miles from Parry Sound, having shafts aggregating 150'.

COLUMBIA EXTENSION MINING CO.**UTAH**

Office: 402 Felt Bldg., Salt Lake City, Utah. Mine at Alta, Salt Lake Co., Utah. Frank B. Cook, mgr.; David Lemmon, supt. Property developed by tunnel, opening up silver-bearing copper and lead ores. Equipment includes gasoline power and mine employs about 15 men.

COLUMBIA MINE.**ARIZONA**

In the Comobabi mountains, southwestern part of Pima Co., Ariz. Mine reported shipping about 6,000 tons gold-silver-copper ore in autumn of 1913.

COLUMBIA MINE.**NEVADA**

Idle. Mine office: Goodsprings, Lincoln Co., Nev. Lands, 6 claims, formerly owned by Columbia Mining Co., said to show a 30' vein having copper in carbonate and oxide ores carrying about 10% copper and up to \$10 gold per ton. The Extension vein, 3' wide, is opened to a depth of 230'. Mine has about 1,800' of workings. Property considered promising.

COLUMBIA RIVER GOLD MINING CO.**WASHINGTON**

Idle. Mine office: Kettle Falls, Stevens Co., Wash. Col. J. M. Fish, pres. and gen. mgr., at last accounts. Lands, 9 claims, on Gold hill, opened by a tunnel and a 350' shaft, with about 2,000' of workings. Shaft shows a vein 5' wide at surface, 12' wide at 200' depth and 43' wide on the 350 level, at latter depth carrying a pay streak of 3' width. Company is said to have expended about \$65,000 on the mine. Equipment includes a 50-h. p. gasoline engine and a 3-drill air compressor. Small test shipments, 1905, gave returns of 22% copper, 3 oz. silver and \$4.60 gold per ton.

COLUMBUS CONSOLIDATED MINING CO.**UTAH**

Office: 201 Judge Bldg., Salt Lake City, Utah. A. H. Cowie, pres.; Chas. A. Walker, vice-pres.; W. O. Williams, sec.-treas.; preceding officers, C. H. Gibbs and Lewis A. Jeffs, directors. Organized 1902, under laws of Utah, and capitalization increased, 1904, to \$1,500,000, shares \$5 par; issued, \$1,417,690. Paid quarterly dividends, Jan., April and July, 1907, aggregating 55 cts., with total of \$212,623.50, and has levied 4 assessments, including No. 3 of 25 cts., March, 1910, and No. 4, of 10 cts., Nov., 1910. Shares are listed on the Salt Lake Stock Exchange. Property was sold, 1913, to Wasatch Mines Co., for 160,000 shares of stock of that company, which stock is to be distributed, and company dissolved.

COLUMBUS EXTENSION MINING CO.**UTAH**

Office: 404 Felt Bldg., Salt Lake City, Utah. Mine office: Alta, Salt Lake Co., Utah. Lawrence Green, pres.; M. R. Evans, vice-pres.; F. A. Whitney, treas.; F. B. Cook, sec. and gen. mgr., and J. R. Walker, directors. David Lemmer, supt. Organized 1906, capitalization \$600,000, shares \$1 par; issued, \$401,424. Lands, 7 claims, 5 patented, 130 acres, west of the mines of the Wasatch Mines Co., and south of the Rexall mine. The claims cover the Oxford and Toledo fissures, both heavy producers, in former years, and the Haskell and Emily fissures.

Development by present company is by a 5,300' tunnel, started in workings of the Wasatch Mines Co. and driven to cut Toledo vein at 1,800' depth or 3,000' on dip, and with crosscuts to reach the limestone-quartzite contact on the Black Jack claim. Employed about 11 men during 1913.

COLUMBUS MINING CO.**UTAH**

Office: 228 South West Temple St., Salt Lake City, Utah. W. A. McEnery, pres.; Walter Scott, sec.-treas., at last accounts. Organized Aug., 1896, under laws of Utah, capitalization \$100,000, shares \$1 par; fully paid and fully issued. Has levied 8 assessments.

Lands, in the Snake Creek district, Wasatch county, are developed by a 700' tunnel. Idle many years.

COLUSA-LEONARD EXTENSION COPPER CO.

MONTANA

Address: Butte, Mont. Dr. O. B. Whitford, pres.; W. W. McDowell, vice-pres.; Meyer Genzberger, treas.; W. E. Reynolds, sec. Organized Oct. 1, 1906, under laws of Arizona. capitalization \$5,000,000, shares \$5 par. Trust Company of America, New York, registrar and transfer agent.

Lands, 5 fractional claims, patented, area 47 acres, consisting of the Maggie placer, Golden Hematite, Little MacQueen, Great Republic, Bavaria placer, Undine and Snow Bird placer, about a mile east of the Colusa and Leonard mines, and near the Pittsmont shafts of the East Butte Copper Co. There is an 800' three-compartment shaft on the Little MacQueen claim lying about the center of the group, that has cut several small stringers of ore assaying up to 9% copper, but none of commercial size, and there is a 7' vein of 2% ore carrying a 14" paystreak said to range 8 to 10% in copper tenor, with small gold and silver values and some lead and zinc. Judging from neighboring properties on the east, ore will be found at considerable depth, if at all.

Equipment includes a good air compressor, a temporary hoist and a 400-gal. electric pump. Property considered promising. Idle since 1907.

COLUSA-PARROT MINING & SMELTING CO.

MONTANA

Office and works: 503 Miner Bldg., Butte, Silver Bow Co., Mont. Hon. Wm. A. Clark, pres.; Wm. C. Siderfin, vice-pres.; W. C. Messias, sec. Organized Nov. 26, 1897, under laws of Washington, capitalization \$500,000, shares \$50 par. Company is practically out of business, its only present property being lands, platted as an addition to the city of Butte.

COMANCHE CONSOLIDATED COPPER CO.

NEW MEXICO

Office: 1201 Alaska Bldg., Seattle, Wash. Mine office: Fairview, Sierra Co., N. M. J. J. Haggerty, pres.; P. D. Johnson, vice-pres.; Marcus Murray, treas.; Maurice D. Leehey, sec.; preceding officers, J. B. Taylor, Mangus McIntosh and J. C. Arkard, directors; Harry B. Johnson, gen. mgr. Organized 1906. Lands, 14 claims, 10 miles from Fairview. Idle several years.

COMER MINES CO.

OREGON

Office: care E. D. Brigham, pres.; 226 W. Jackson Blvd., Chicago. Mine office: Prairie City, Grant Co., Ore. D. A. McKeown, supt. Organized 1907, under laws of Oregon, capitalization \$5,000,000, shares \$1 par, as successor to Standard Consolidated Mines Co. Lands, 26 claims, area 500 acres, on both sides of Dixie creek, in the Quartzburg district, showing auriferous ores of copper, nickel and cobalt. The mine is said to have about 2 miles of workings, and equipment includes a 50-ton concentrator. Some ore was shipped, 1906. Idle several years.

COMET GOLD & COPPER MINING CO., LTD.

IDAHO

Office: care Jos. F. Whelan, sec., 408 Sixth St., Wallace, Idaho. Mine near Mullan, Shoshone Co., Idaho. Archibald McCullom, pres. and gen. mgr. Capitalization \$100,000, shares 10 cts. par. Lands, 4 claims, adjoining the Springfield, east of Mullan, on Stevens' peak, and near 2 railroads. Property shows 2 veins, of 10' and 15' estimated width, about 150' apart, carrying chalcopryite and bornite, with iron and quartz gangue. Development is by tunnel, cutting a hematite vein, with about 1,000' of workings.

Property was worked in a small way, 1912-13, with proceeds of assessments levied. Last assessment of one-half mill per share, due Oct. 20, 1913.

COMET MINING & MILLING CO.

MONTANA

Office: Coeur d'Alene, Idaho. Mine office: Whitefish, Flathead Co.,

Mont. Dr. Max A. Dorland, pres.; Fred Eppinger, vice-pres.; J. H. Wiggert, sec.; Louis J. Michaud, mgr., at last accounts. Organized 1909, capitalization 1,000,000 shares. Development is by a short tunnel. Presumably idle.

COMMERCIAL MINING CO.

ARIZONA

Office: care Phelps, Dodge & Co., 99 John St., New York. Mine offices: Prescott and Skull Valley, Yavapai Co., Ariz. Maj. A. J. Pickerell, gen. mgr.; A. B. Peach, supt. Is controlled by Phelps, Dodge & Co., Inc.

Property includes the Senator and Snoozer mines, producing high-grade sulphide ore from fissure veins and the Copper Basin mine with 18 claims, patented, in the Copper Basin, about 6 miles from the Santa Fé railroad. Development is by a 300' two-compartment shaft, bottomed in good ore. Mine has been extensively developed, opening up large reserves of 3% oxidized ores according to recent reports. Employs an average of 25 men and ships 40 tons per day of 7 to 10% sulphide ore to the Douglas smelter.

COMMONWEALTH MINES CO.

UTAH

Office: 420 Herald Bldg., Salt Lake City, Utah. Mine office: New-house, Beaver Co., Utah. Wm. M. Bradley, vice-pres.; W. T. Aiken, sec-treas.; Newton A. Dunion, gen. mgr.; preceding officers, C. H. Strevell and Jas. H. Paterson, directors; Ralph B. Kenyon, supt. Organized Nov., 1906, under laws of Wyoming, capitalization \$600,000, shares \$1 par.

Lands, the Commonwealth mine, 7 claims, in the Star district, adjoining Lady Bryan and Progressive mines. Claims show Topache limestone with intrusive sheets of altered green porphyry, cut by fissures, with more or less mineralization along fissures and outward along certain limestone beds. Considerable lead ore was produced from surface workings in the past and the Nellie claim has copper sulphides in its bottom workings. The Beaver claim has ores giving average assays of 13.2% copper and 17.2 oz. silver per ton, with more or less lead. Mine is developed by a 1,400' tunnel, with a back of about 300', and has secured ore assaying up to 4% copper, 20% lead and 60 oz. silver per ton. Equipment includes gasoline power and an air compressor. Development shows but little ore, mostly low grade, and claims are not especially promising according to geological reports.

COMSTOCK COPPER MINING CO., LTD.

IDAHO

Secretary's office: Wallace, Idaho. Mine office: Burke, Shoshone Co., Idaho. E. S. Amsden, sec.; Otto A. Olsson, Eagle Block, treas.; John H. Nordquist, mgr. Organized under laws of Idaho, capitalization \$1,500,000, shares \$1 par. Lands are on Baldy mountain, east of Burke. Is developing on a small scale, raising money by assessments of 1 mill per share, last one delinquent, Aug. 23, 1913.

CONCEPCION y ANEXAS; COMPAÑIA MINERA LA.

MEXICO

Office and mine: Catorce, San Luis Potosi, Mex. Organized under laws of Mexico, capitalization 300,000 pesos, shares 100 pesos par. Property has ore carrying values in copper, lead and silver. Idle some years and apparently moribund.

CONCONULLY COPPER CO.

WASHINGTON

Idle. Mine office: Conconully, Okanogan Co., Wash. Organized Nov., 1908. Lands, 11 claims, adjoining the Wellington mine, about 1 mile north of Conconully, on the eastern side of the Salmon river. Property shows 5 veins, traceable 1 mile, estimated at 12', 20', 30' and 40' in surface width, carrying copper and silver values in about equal quantities, with small values in lead and gold. Development includes about 800' of tunnels.

CONCORD MINING CO.

IDAHO

Idle. Office: P. O. Box 371, Boston, Mass. Westley Jones, secretary, at

last accounts. Organized 1902, under laws of Maine, capitalization \$500,000, shares \$5 par, nonassessable; issued, 44,000 shares. Lands, 18 claims, patented, in the Robbins district, Idaho county, are developed by a 300' shaft with about 2,000' of workings, showing auriferous and argentiferous copper and lead ores. Has a small steam plant.

CONGO MINING CO.**WYOMING**

Idle. Property, 5 claims, in the abandoned Dillon camp, Medicine Bow range, Carbon county, developed by shallow shaft and tunnel showing low-grade copper ore.

CONGOR GOLD & COPPER MINING CO.**UTAH**

Office: 506 Auerbach Bldg., Salt Lake City, Utah. Mine near Bingham Canyon, Salt Lake Co., Utah. Glen R. Bothwell, pres. and gen. mgr.; R. C. McConaughy, vice-pres.; Frank E. Loose, sec.; preceding officers, E. F. Jenkins and C. G. Hall, directors, at last accounts. Capitalization \$1,000,000, shares \$1 par. Property, 10 claims, area 150 acres, adjoins the Bingham Amalgamated on the north, in Bingham Canyon, Salt Lake Co., Utah. Mine reported to have about 100,000 tons of ore exposed, running from \$6 to \$50 per ton and averaging \$14. Company has a contract with the Montana Bingham Consolidated Mining Co., shipping its ores through the Miller Ore Transportation tunnel of that company to the Denver & Rio Grande railroad tracks at a cost of 25 cts. per ton of ore and 12½ cts. per ton of waste.

CONGRESS CONSOLIDATED MINES CO.**ARIZONA**

Address: care T. M. Murphy, Santa Fé railroad offices, Prescott, Ariz. Mine near Wickenburg, Maricopa Co., Ariz. Property is an old and supposedly worked out gold mine that has produced copper as a by-product, last production being 2,979 lbs. in 1909, with 8,710 oz. gold and 16,176 oz. silver. Company has been owned and controlled by Development Co. of America, now bankrupt.

CONGRESS GOLD & COPPER CO.**COLORADO**

F. P. Goudy, et al., lessors, Silverton, San Juan Co., Colo. J. B. Ross, pres. and gen. mgr.; Guy W. Mallon, vice-pres.; Frank L. Ross, sec.-treas.; preceding officers are the directors; M. E. Rumery, mine supt. Organized April 16, 1908, under laws of Colorado, capitalization \$500,000, shares \$10 par. Bonds, \$100,000 authorized, at 6%; issued, \$50,000.

Lands, 3 claims, area 30 acres. Owns the Congress and Arlington mines at Red mountain, 12 miles south of Ouray in San Juan county. Company also owns the Midway mine in Ouray county. The Congress is a famous old mine worked 1884-93, said to have produced about \$400,000 worth of ore, averaging 18% copper and 11 oz. silver per ton, with small gold values. The mine, idle for some years, through litigation, has a 270' shaft with about 1,500' of workings, showing chalcocite, reported by company to average about 16% copper, 6 oz. silver and \$1 gold per ton. Mine has a 50-h. p. steam plant. Company idle, and mine in the hands of leasers, 1912, who are reported to have opened a shoot 6' wide of enargite ore carrying 7% copper and 40 to 120 oz. silver per ton.

CONKLING MINING CO.**UTAH**

Office: 520 Atlas Block, Salt Lake City, Utah. Mine office: Park City, Summit Co., Utah. Col. Nicholas Treweek, pres.; Wm. C. Hall, vice-pres.; Geo. A. Lund, sec.; J. Leonard Burch, treas.; preceding officers and Margaret Treweek, directors. Organized Sept. 17, 1908, under laws of Utah, capitalization \$500,000, shares \$1 par, assessable. Is a close corporation, with 25% of stock owned by Silver King Coalition Mines Co., but has litigation pending, in the Federal courts, against the Silver King, on a charge of illegal extraction of \$800,000 worth of ore.

Lands, 2 claims, 2 miles from a railroad, carrying auriferous copper and lead ores, developed by a 1,000' tunnel on the lands of the Silver King. Apparently no work has been done by present company.

CONQUEST CONSOLIDATED MINING CO.

WASHINGTON

Office: care W. C. Ingalls, sec., 209 Beech St., Arlington, N. J. Mine office: Newport, Stevens Co., Wash. Organized under laws of Washington, capitalization \$5,000,000, shares \$1 par, as a merger of Conquest Copper & Gold Mining Co. and American Eagle Gold Mining Co. Annual meeting, second Tuesday in November.

Lands, 15 claims, area 300 acres, 6 miles north of Newport, showing 7 orebodies, of which 1, under development, 1 to 6' wide and traceable 2,000', is opened by a 186' shaft and by tunnels of 200', 700' and 500', with 3,000' of workings, showing slightly auriferous and argentiferous copper sulphides of concentrating grade, with considerable ore blocked out and on the dump. Has steam power, with hoist good for 1,000', and several mine buildings. Has been worked in a small way for several years.

CONSOLIDATED ARIZONA SMELTING CO.

ARIZONA

Office: 15 Broad St., New York. Mine office: Middleton, Yavapai Co., Ariz. Works office: Humboldt, Yavapai Co., Ariz. Victor I. Cumnock, pres.; Frank W. Thompson, sec.-treas.; A. H. Wethey, gen. mgr.; Wm. Schall, Jr., John H. Flagler, E. S. Hooley, Thos. A. Marlow, C. A. Kittle, Frank A. Dillingham, directors. Organized Dec. 22, 1908, under laws of Maine, capitalization \$9,200,000, shares \$5 par, of which \$974,500 is reserved for bond conversion. Bonds, \$1,200,000, 5% 30-year income bonds authorized; 974,500 outstanding. Has a \$255,000 mortgage on property. Acquired at foreclosure sale the properties of the Consolidated Arizona Smelting Co. (see Vol. X) and the Arizona Smelting Co. The intricate relationship of the old company and its subsidiaries is fully described in Vol. X. The most valuable mine owned by the company is the Blue Bell, a group of 3 claims, carrying 3 fissure veins, in Algonkian slates, with quartzite footwall and granodiorite hanging, developed by 6 shafts, deepest 300', and 2 short tunnels. Property carries cuprite, malachite and chalcopryrite, all slightly argentiferous and auriferous, with a large and promising orebody on the 300' level. Mine is connected with the Bradshaw Mountain railway by a tram line, and has electrical machinery, taking current over an 18-mile transmission line. Mining 100 tons a day and exploratory work was in progress at last reports. The De Soto mine is also operated by this company.

The reduction plant, well located for custom business, includes sampling, concentrating, roasting, smelting and converting departments, with a machine shop and smithy. All buildings are of structural steel frame, with brick walls or corrugated-iron sheathing, floored with cement. The yards have 4 miles of 65-lb. railway tracks.

The 400-ton concentrator, size 160x200', known as the De Soto mill, has two 200-ton units, each having one 10x20" and two 7x10" Blake crushers, 1 centrifugal crusher, 3 elevators, 2 sets of rolls, one 25' Hancock jig, 10 Wilfley tables, 8 Overstrom tables, 8 vanners, 4 trommels, 8 Callow tanks and Richards, Johnson and Anaconda classifiers. The mill has a large slum pond, and overflow water is returned to the mill for re-use.

The smelter, of 1,000 tons rated daily capacity, has three 100' Edwards mechanical roasters, burning petroleum, each with 2 series of rabbling arms, rotated in opposition, with 44 rabbles to each furnace, each making 1 r. p. m., except the 2 end sets, which make 2 r. p. m. There are three 100' reverberatory furnaces, of the Anaconda type, rated at 400 tons daily

capacity, burning petroleum. Matte from the reverberatory furnaces is tapped into a launder, which delivers it to a ladle in the converter room.

The blast-furnace department has both lead and copper stacks, with a 200-ton 48x60" lead furnace, and a 250-ton water-jacket blast furnace for copper. Slags are granulated. The stack is of reinforced concrete, 180' high, 18' in diameter at the base and 11' at the top.

The converter department has 2 stands, with shells of barrel type, rotated electrically. Equipment includes a 40-ton Whiting electric crane with a 15-ton auxiliary crane, cranes also taking hot slag from the converters and pouring same into the reverberatories and delivering shells.

The power plant has four 345-h. p. Stirling water-tube boilers, burning waste gases from the reverberatories, steam being sent therefrom through a 10" pipe line, under 150-lb. pressure. Machinery includes 2 Connorsville blowers, a Nordberg duplex cross-compound air compressor, with 40x42" air cylinder and 18x36x42" steam cylinders. There are two 300-kw. 480-volt 3-phase 60-cycle generators, direct-connected to two 16x32x36" Nordberg cross-compound engines, and an electric turbine pump. Electric power is furnished the Blue Bell mine, 18 miles distant, current being transmitted at 15,000 volts, stepped down to 440 volts, at the Blue Bell transformer station.

Fuel is coke for blast furnaces and petroleum for the reverberatories, with 3 steel tanks, of 350,000 gals. capacity, for oil. A pump station on the Agua Fria river has two 4-stage centrifugal electric pumps and 1 steam pump, with 8" and 10" pipe lines to the works.

After several years' idleness, expenditure of large sums in remodeling and several unsuccessful attempts at resumption, plant was again blown in, 1912. Operations were hampered by construction work, Sept., 1913, but plant was treating 150 tons per day, mostly from the Blue Bell and De Soto mines.

CONSOLIDATED CENTRAL BUTTE COPPER CO. MONTANA

Office: 70 Higgins Blk., Missoula, Mont. R. R. Jones, pres.; R. H. Wearing, vice-pres.; R. M. Cobban, sec.; D. J. Charles, treas., and E. E. Hershey, directors. Organized Oct. 29, 1906, under laws of Montana, capitalization \$1,200,000, shares \$1 par, assessable; issued, 446,000 shares. Has levied 3 assessments, aggregating 6¼ cts. per share, or about \$28,000. Annual meeting, second Thursday in January.

Property is a one-third interest in the North Star, South Star and January claims, patented, and the mineral and mining rights in about 100 acres of patented placer claims, adjoining the Ophir claim (Butte Central Copper) on the east. The North Star, South Star and January claims are developed by a 225' shaft, showing an orebody 3 to 6' wide. Idle several years for want of working capital.

CONSOLIDATED COPPER CO. OF PARRY SOUND. ONTARIO

Office: 705 Palladio Bldg., Duluth, Minn. Mine office: Parry Sound, Parry Sound district, Ont. Robt. Forbes, pres.; Robt. Millard, vice-pres.; J. G. Harris, sec.-treas.; preceding officers, A. C. Le Richeux, Frank Cox, E. E. Rorem, Dr. J. D. Budd, F. L. Young, and C. J. Jackes, directors. Organized Feb., 1902, under laws of Ontario. capitalization \$5,000,000, shares \$1 par; issued, about \$3,100,000.

Lands, 1,500 acres, patented, carrying considerable standing timber, in Foley, McDougall, Haggerman and Conger townships. Part of property formerly was held by Hattie Belle Gold, Copper & Nickel Co. Ores occur as contact deposits between slate and quartzite, and as fahlbands, ore being mainly chalcopryite, with occasional bornite and chalcocite, mainly low in grade, but with occasional seams of high-grade ore. There are 18 differ-

ent orebodies, shown by test pits and stripping, of which 2 are somewhat developed. The fahlbands are said to show a width of more than 1,000', carrying 7 bands of fairly good ore, of 200' estimated aggregate width, between which is low-grade ore, part of which may be amenable to concentration. Ores assay 1.5 to 12% copper, 3 oz. silver, and from a few cents up to \$8 gold per ton. Property has a 180' vertical shaft, and about 25 pits of 10 to 30' depth.

The Spider Lake mine has a shaft house, and steam hoist good for 500', with necessary mine buildings, and a considerable orebody has been exposed by trenching.

The Lefex mine has shafts of 90' and 40', showing nothing of particular promise. The Lefex has an iron gossan, carrying up to 2% copper and \$2 to \$3 gold per ton. A 600-lb. test shipment, from the 65' level, returned 30% copper, and various samples have shown from 0.5 to 3% nickel, and from nothing to \$20 gold per ton. Company was planning, 1913, to resume development work on the Lefex property, after several years of idleness.

CONSOLIDATED COPPER CREEK MINING CO. ARIZONA

Office: 707 Shubert Bldg., Kansas City, Mo. Letter returned unclaimed from former mine office, Mayer, Yavapai Co., Ariz. E. J. White, sec.-treas. and mgr., at last accounts. Organized 1906, under laws of Arizona, capitalization \$1,000,000, shares \$1 par. Lands, 15 claims, known as the Sunset group, adjoining the Rosalie Copper Co.; carrying slightly argentiferous copper ores, with a 100' two-compartment shaft, equipment including a 125-h. p. boiler, 8x10" hoist and 8-drill air compressor. Company is in bad shape financially, and is regarded with suspicion. Idle several years.

CONSOLIDATED COPPER MINES CO. ARIZONA

Idle. Mine near Swansea, Yuma Co., Ariz. Thos. J. Carrigan, pres.; Frank Robbins, vice-pres. and gen. mgr.; Jas. W. Wilkinson, sec.-treas., at last accounts. Organized 1909, under laws of Arizona, capitalization \$5,000,000, shares \$1 par.

Lands, 140 claims, area 2,800 acres, in 11 groups, mainly in the Cienega district, in the western part of Yuma county, stretching for 10 to 12 miles between Swansea and Parker, from the Revenue group on the east to the Copper Dome on the west. Property includes the Revenue group of 22 claims, and Echo group of 29 claims, shortly west of the Clara Consolidated; the Crescent, 1 claim; El Molino, 12 claims; Copperfields, 4 claims; Comet, 3 claims; Hottentot, 30 claims; Ogden, 8 claims; Ozone, 8 claims; Mineral Zone, 10 claims, and Copper Dome, or Dome City, 11 claims.

The properties have numerous old pits and shallow shafts, short tunnels and open cuts, but apparently none have permanent improvements. The Revenue mine, which apparently has the most development, has a 200' incline shaft, and a 250' tunnel. The Hottentot group is said to have smelting ore developed. The Copper Dome group has a northwest series of fault fissures, in schist and limestone, carrying auriferous oxidized copper ores. Equipment includes gasoline power only. The geologic features of this section are described by Howland Bancroft in U. S. G. S. Bull. 451.

CONSOLIDATED COPPERMINES CO. NEVADA

Chas. F. Smith, sec.-treas., 71 Broadway, New York. Mine office: Ely, White Pine Co., Nev. Edwin F. Gray, gen. mgr.; Chas. F. Rand, pres.; Erastus T. Tefft, vice-pres.; Thos. F. Cole, Joseph B. Cotton, Wm. B. Joyce, Isadore Hernsheim, R. C. Lupton, Mulford Martin, C. L. Perkins, James Phillips, Jr., W. Hinkle Smith and Wm. B. Thompson, directors. Organized 1913, under laws of Delaware, capitalization \$8,000,000, shares \$5 par. Debentures \$2,500,000; convertible bonds bear 7% and are redeem-

able by lot at 110 plus accrued interest, on any interest day, not later than 1928. Guaranty Trust Co., New York, registrar.

Company was organized to secure control of the Giroux Consolidated Mines Co., Coppermines Co., Butte & Ely Copper Co., and Chainman Consolidated Copper Co., acquiring stock in the several companies on the basis of 1 new share for $2\frac{1}{2}$ Giroux shares; 1 for $6\frac{1}{4}$ Butte & Ely; 1 for $3\frac{1}{2}$ Coppermines, and 1 for 25 Chainman, and will have 772,568 shares outstanding when, and if all of the outstanding stock of the four companies is finally acquired. These properties, aggregating 160 claims, in the heart of the Ely district, are separately described under their respective titles, though they will hereafter be operated as parts of one company. A concentrator and reduction plant will be built in the ensuing year. As but \$300,000 of the bond issue was subscribed for, the company has arranged to borrow \$1,000,000 on the bonds as security.

CONSOLIDATED COPPER MINING CO.

UTAH

Office: Provo, Utah. Mine office: Eureka, Juab Co., Utah. J. C. Jensen, pres.; J. W. Burton, vice-pres.; A. A. Biorn, sec.-treas.; preceding officers, H. S. Birch, Theo. Cederstrom and Cornelius Cederstrom, directors. Organized 1911, capitalization \$100,000, shares 10 cts. par; issued 550,000 shares.

Lands, 6 claims, in the North Tintic district, slightly developed, show a narrow vein of low-grade copper ore, with gold and silver values, and a deposit of black marble, said to be of good quality. Idle.

CONSOLIDATED COPPER M., M. & SM. CO.

COLORADO

Office: 417 Temple Court, Denver, Colo. Mine office: Eldora, Boulder Co., Colo. C. C. Munson, pres.; W. H. Hoke, vice-pres.; M. P. Givens, sec.; M. L. Ericson, treas. Organized Oct. 16, 1899, under laws of Colorado, capitalization \$2,000,000 shares, \$1 par. Annual meeting, second Tuesday in September.

Lands, 27 lode claims, partly patented, area 150 acres, known as the Fourth of July group, 3 additional tunnel claims, a placer claim and a 160-acre timber claim, giving total holdings of about 600 acres, at the southern base of Arapahoe peak, in the Grand Island district. Property is said to have 4 contact deposits, with phonolite on one wall, of which 1, under development, 1906, was said to average about 7' in width, and to carry up to 60' of sulphides, of concentrating grade, including galena, chalcopryrite, bornite and chalcocite, all auriferous and argentiferous. Development is by 3 shafts, deepest 360', and the Fourth of July tunnel, of 4,800' length. Has steam power, a 6-drill Leyner 2-stage air compressor and necessary buildings. Company has been idle several years, and the property is being worked by leasers.

CONSOLIDATED KANSAS CITY SM. & REF. CO.

TEXAS

Office: 165 Broadway, New York. Works office: El Paso, El Paso Co., Tex. Kuno Doerr, mgr.; Jas. J. Ormsbee, supt. Is owned by American Smelting & Refining Co., and property is described under that title.

CONS. KING DEV. & COLUMBIA COP. MG. CO.

ARIZONA

Office and mine: Jerome, Yavapai Co., Ariz. Hon. Geo. W. Hull, pres.; Mary A. Hull, sec. Organized under laws of Arizona, capitalization \$6,000,000, shares \$1 par. Lands, 9 claims, area 150 acres, south of the United Verde mine, showing several bodies of oxidized and sulphide ores, carrying fair values in copper, gold and silver. Mine has a 100' shaft and a 750' tunnel, with about one-half mile of workings. Development in progress, 1913.

CONS. MINES, SMELTER & TRANSP. CO.

ARIZONA

Office: 1406-43 Exchange Place, New York. Geo. A. Beatson, pres.;

Geo. O. Earhart, sec.; John W. Prout, Jr., mgr. Organized 1909, as a reconstruction and merger of Alto Copper Co. and Mowry Mines Co. Owns the Alto and Mowry mines with 21 claims, area 420 acres, 8 miles from Patagonia, in the Santa Rita mountains, near the Mexican border. Company has 2 veins under exploitation, 1 yielding gray copper ore, the other lead-silver. Developed by several tunnels and 3 shafts of 73', 100' and 150', with 3,000' of workings. Ores are chalcopyrite, galena and sphalerite, giving assays of 8 to 12% copper, 10 to 20% lead, 10 to 30 oz. silver and \$3 to \$20 gold per ton.

The Alto was closed down, 1907, re-opened, 1910, and has been worked in a modest way since then.

Equipment includes a steam plant, with 3 hoists, good for 600' each, and an 8-drill Sullivan air compressor. There is a machine shop, smithy and about 25 other buildings. Company reported to have a 100-ton concentrator and 100-ton smelter.

CONS. MG. & SM. CO. OF CANADA.

BRITISH COLUMBIA

Secretary and office: J. Kitto, 95 King St., E., Toronto, Ont. Works office: Trail, Trail district, B. C. W. D. Matthews, pres.; Geo. Sumner, vice-pres.; preceding officers, Walter H. Aldridge, E. B. Osler, Chas. R. Hosmer, H. S. Osler, W. L. Matthews, J. C. Hodgson and Wm. Farwell, directors; Robt. Holden Stewart, gen. mgr.; Selwyn G. Blaylock, asst. mgr.; James Buchanan, smelter supt.; J. F. Miller, refinery supt.; M. E. Purcell, supt. Centre Star mines; F. S. Peters, supt. Le Roi mines; C. H. McDougall, supt. St. Eugene and Sullivan mines; K. B. Carruthers, supt. Molly Gibson mine; W. A. Cameron, supt. Richmond-Eureka mine; John M. Turnbull, engr.

Organized 1905, as Canadian Consolidated Mines, Ltd., capitalization \$5,500,000; name changed, Jan. 1, 1906, to present title, and capitalization increased, Oct., 1909, to \$7,500,000, shares \$100 par; issued, \$5,805,200. Company's fiscal year ends Sept. 30. Annual meeting, third Tuesday in December.

For fiscal year 1912, net profits were \$310,345.97, and surplus account showed a balance of \$1,183,635. Dividends for fiscal years were \$234,940 in 1906; \$480,005 in 1907; \$66,940 in 1908; \$232,176 in 1912, with total dividends, to end of 1912, of \$1,014,061, 8% dividends resumed July 2, 1913, when 2% was paid.

The company was formed to take over the following properties, either by direct ownership, or by stock control: War Eagle Consolidated Mining & Development Co., Ltd.; Centre Star Mining Co., St. Eugene Consolidated Mining Co., the Rossland Power Co., and the Trail smelter, formerly operated by the British Columbia Southern railroad. In 1907 the Iron Mask, Idaho and Enterprise mines at Rossland were purchased and the Phoenix Amalgamated Copper Mines, Ltd.; also the Keystone and Four Ace claims adjoining the Phoenix, located at Phoenix, B. C. In 1910 the company acquired the La Plata, or Molly Gibson group, near Nelson and the No. 7 group in the Boundary district. In 1911 company purchased control of the Fort Steel Mining & Smelting Co., Ltd., owning the Sullivan silver-lead mine, near Fort Steel. In 1912 company purchased all the property of the Le Roi Mining Co. at Rossland, the Virginia mine, the Abe Lincoln mine and the Iron House mine, all at Rossland, also the Silver King Mines, Ltd., at Nelson.

The Le Roi-Centre Star group, on the southern slope of Red mountain, at Rossland, is the principal property. Country rock is a series of effusive and fragmentary volcanics of the Paleozoic age, intruded by an elongated mass of monzonite-porphyry. This monzonitic mass, with its im

rocks, has been intruded by a large number of nearly vertical dikes, from a few feet to 250' wide, with generally N.-S. trend, the dikes being basaltic, and occasionally slickensided, larger dikes cutting off the veins completely, with the more important orebodies occurring at the points of intersection, and having a series of faults, mainly parallel to the dikes. Ore occurs in shoots of 3 to 50' width, and 50 to 600' length, widening at intersections of veins with dikes. Ore is strongly auriferous and fairly argentiferous chalcopyrite, associated with pyrite, with gangue of silicious altered country rock, ore ranging 0.5 to 2% copper and \$8 to \$20, and occasionally up to \$100, gold, per ton. Pay shoots extend, in some cases, from wall to wall, and form local enrichments, walls in some cases being very indistinct, and ore shading into the country rock. There are several veins, the more important being the Centre Star and War Eagle, on which the mines are opened mainly, these being shear zones, carrying chalcopyrite disseminated mainly in pyrrhotite, with some pyrite and occasional arsenopyrite.

The Rossland group includes the Le Roi, Centre Star, War Eagle, Iron Mask and Idaho mines, which are practically one, all connected by drifts and crosscuts, and the group has about 40 miles of workings. For fiscal year 1912, new openings were 12,800', with 16,850' of diamond drilling. Mines are worked by overhand stoping, partly on the shrinkage system and partly timbered with square sets, cut from round timber. The Centre Star group has electric haulage, with 10 electric locomotives, hauling 2-ton side-dumping cars to the underground ore pockets of the Centre Star shaft. The ore pockets are on the hanging-wall side of the shaft, 2 on each level, 1 directly behind the other, the front bin, of 70 tons capacity, being for waste, and the 150-ton back bin for ore. The Centre Star mine has a 250-gal. electric pump, and the Iron Mask mine has a centrifugal pump. The mines have electric signals throughout.

The Centre Star mine has a 2,200' three-compartment shaft, sunk at about 68°, with 16 levels opened, at intervals of 125 to 175', this being the deepest shaft in Canada. The Centre Star has 8 or 10 different orebodies, but mining is principally from the Centre Star vein, the ore of which averages 0.6% copper, 0.3 oz. silver and \$8 to \$10 gold per ton.

The War Eagle mine, including the War Eagle, Richmond, Crown Point and other claims, adjoins the Centre Star and carries 3 veins, 2 of which, known as the War Eagle and Josie, are nearly parallel, and are intersected by the third at practically right angles. The surface plant has been dismantled, and the mine is now operated through the Centre Star shaft, the 1,500' three-compartment War Eagle shaft, sunk at 50°, now being used for handling men, timber and supplies. The War Eagle mine has 11 levels opened.

The Le Roi mine has a 1,750' five-compartment shaft, connected underground with the Centre Star shaft, developing a length of 4,500' on the Centre Star vein in the area commanded by these shafts. Threatened litigation with Le Roi No. 2 was settled, 1913, by mutual agreement and concessions.

The Idaho mine, just east of the Centre Star, and practically a part of the latter, has ore of good grade, averaging better than that of the Centre Star mine proper. The Crown Point mine, at Rossland, is an occasional small shipper of fluxing ore.

The Centre Star mine has a 106' wooden shaft house, with 11' sheave wheels and a Vezin sampler. A 24x36" Jenckes-Farrel crusher, of 100 tons hourly capacity, driven by a 75-h. p. alternating motor, delivers ore to a link-belt conveyor which discharges into bins, there being 1 large bin for waste, 2 bins for coarse ore and 2 for fine ore, waste being sold for railway

ballast. The Centre Star engine house has an 1,100-h. p. 28x60" Nordberg hoist, with two 10' drums of 5' face, good for 10-ton loads to depth of 3,000' at a speed of 2,000' per minute, using a 1¼" plow-steel hoisting rope, and there is a 14x18" Wellman-Seaver-Morgan geared auxiliary hoist. The main hoist takes cages 10' high, boxed on 3 sides and open in front, having hinged bottoms that are turned back when hoisting ore, with 4-ton skips swung under.

The War Eagle shaft has a 300-h. p. geared hoist, run by compressed air, which is reheated before using. The War Eagle shaft house is connected by an 1,100' incline tram, having a 300' drop, with railway ore bins, but is no longer used for extraction.

The Le Roi shaft is equipped with a Fraser & Chalmers hoist, good for a depth of 3,000', and there is also a smaller hoist having 6' drums, two 40-drill air compressors and other necessary equipment.

Electric power is used extensively, the mine taking current at 20,000 volts from the Bonnington Falls plant of the West Kootenay Power & Light Co., 35 miles distant, stepped down at the mine to 2,000 volts for distribution and use. The compressor room has a 120-kw. direct-current generator, driven by an alternating current motor, supplying current at 250 volts for electric motors on surface and underground, and for lighting. The Centre Star plant has two 40-drill compressors, one a Canadian-Rand Corliss duplex compound 2-stage compressor, with 22" and 40" steam cylinders and 48" stroke, with 28x32" air cylinders, but the steam cylinders have been discontinued, and compressor is rope-driven by a 650-h. p. Westinghouse induction motor. The other compressor is a hybrid, built over from an Ingersoll straight-line into a duplex machine having 2 Canadian-Rand cylinders, rope-driven, by a 600-h. p. Canadian Westinghouse synchronous motor.

Buildings at the Centre Star group include a large carpenter shop, a well-equipped smithy and a good machine shop doing all ordinary repairing.

The Number Seven mine, 8 claims, area 300 acres, 8 miles southeast of Greenwood and 3 miles east of Boundary Falls, has a fissure vein of 18" to 7' width, carrying auriferous and argentiferous lead and zinc sulphides, with quartz gangue, of about \$10 per ton average value. The mine had a 300' main shaft, with 3,357' of workings, June 30, 1912. Equipment includes electric power, with a hoist and 10-drill air compressor. The mine has a 3-mile aerial tram to Boundary Falls, and a 5-mile wagon road to Phoenix, and employs about 30 men.

Operations at Rossland, 1913, have been extensive and the pay roll the largest the camp has ever had. New machinery has been installed at the Centre Star, War Eagle and Le Roi mines and shipments now aggregate nearly 1,000 tons daily. Production for the 6 months ending June 30, 1913, was 101,000 tons of gold-copper ore.

The Phoenix Amalgamated group at Phoenix, Boundary district, B. C., was taken over, 1909, from the Phoenix Amalgamated Copper Mines, Ltd. Lands are 11 claims, 450 acres, and the mine had about 7,500' of workings, June 30, 1912.

The Richmond-Eureka mine, at Sandon, B. C., has argentiferous lead and zinc ores, developed by tunnels, and employs about 20 men.

The Sullivan mine, at Kimberly, is a lead-zinc producer, employing about 100 men and shipping 100 tons of ore daily.

The Molly Gibson mine, bought 1910, is a silver-lead property, formerly owned by Molly Gibson Mining Co., Ltd., and later by La Plata Mines, Ltd. The mine is equipped with a 100-ton mill and employs about 40 men.

The St. Eugene mine, at Moyie, is the largest Canadian lead mine.

having produced about 1,000,000 tons of ore to end of 1912. The mine has about 20 miles of workings, and is equipped with a 500-ton mill, employing about 20 men.

The Silver King mine on Toad mountain, back of Nelson, purchased in 1912, was unwatered in 1913, the surface plant repaired, machinery installed and made ready for production. The mine works well mineralized fissure veins in granite, yielding high-grade silver-copper ores.

In July, 1913, the company took a bond on a group of copper claims on Howe sound, near the Britannia mine.

The Trail smelter, located near the International boundary line, treats both copper and lead ores and does an extensive custom business in addition to treating the company's ores. In 1913, seven furnaces were in blast and 600 men employed.

The sampling mills are 3 in number, equipped with crushers and Vezin samplers. No. 1 mill, for copper ores, has 1,250 tons daily capacity; No. 2, for lead ores, has 500 tons daily capacity, and No. 3, for either copper or lead ores, has a daily capacity of 750 tons with fine crushing, or 1,000 tons with coarse crushing.

The smelter has a calcining department, and blast-furnace departments for copper and for lead. Ore, coke and fluxes are delivered in dump cars, drawn by three 10-h. p. electric locomotives, from the sampling mill bins to the charge bins, and from the charge bins to blast furnaces. The works were treating upwards of 30,000 tons of ore monthly at the close of 1912.

The copper smelter, of 1,800 tons daily capacity, has two 42x240", one 42x263", and two 42x300" Brückner blast furnaces, taking a 32-oz. cold blast. Ore is treated crude in the blast furnaces, making a first-fusion product of 10 to 15% copper tenor, which is granulated and given a preliminary roast in O'Hara furnaces of 9x97' and 12x97', with 85 tons daily roasting capacity, which reduces the low-grade matte from 25% sulphur to 10%. Final roasting is done in 9 Huntington-Heberlein sintering pots that are used for copper exclusively, giving a matte containing only about 3% sulphur. The matte from the sintering department is resmelted with low-sulphur crude ore, in another blast furnace, yielding a matte of about 40% copper tenor, which is shipped to Tacoma for conversion.

The lead smelter, of 350 tons daily capacity, has 45x140" and 45x160" blast furnaces, with mechanical feed, taking mainly calcined ores, crude lead ores being roasted in seven 26' Godfrey furnaces, which reduce the sulphur from the original tenor of 16% to only 8%, and these calcines are re-roasted in 15 nine-foot Huntington-Heberlein sintering pots, yielding a product carrying only about 3% sulphur. The fully sintered ore, carrying 30 to 50% lead, is smelted in the blast furnaces, each making 50 to 85 tons of lead bullion daily, with about a 4% matte fall. This matte is roasted and again put through the blast furnaces, and slags are granulated.

In connection with the smelter is an electrolytic lead refinery, handling silver-lead bullion. This plant, of 75 tons daily capacity, was the first electrolytic lead refinery ever built, and uses the Betts process. There are 596 tanks, with an electric crane for handling anodes and cathodes. The lead is of exceptional purity, with average assay of about 99.997%, which means that a short ton of lead carries only about 1 oz. of impurities, which is marvelously successful work.

The silver refinery, taking silver sludge from the electrolytic lead tanks, has a water jacket reverberatory furnace for the production of doré metal, and the necessary kettles, tanks and bluestone plant for parting the precious metals with sulphuric acid, also furnaces for melting and casting the silver and gold bullion. Products are silver 0.999 fine, and gold 0.995 fine.

Power for the reduction works is electric throughout, brought 30 miles from Bonnington falls, on the Kootenay river, received at the transformer station at 32,000 volts, and there stepped down to 550. The installed electric capacity is about 3,000 h. p.

The works have a central heating station and well-equipped machine, carpenter and boiler shops. The assay office, which handles an unusual variety of work, in great detail, is exceptionally commodious and well equipped.

In 1913, the smelter has had many betterments, both in the lead and copper smelting departments. These include a change of lighter crushing rolls, construction of a concrete bin for collection of roasted ore from the Huntington-Heberlein roasters, installation of 2 Wedge roasters; re-arrangement of the 36 converter pots; provision of a Niles 20-ton electric crane and of a Hayward clam-shell bucket (for handling sinter), for use in the H. & H. department; extension of building for H. & H. plant to make a total length of more than 400' with a width of about 60'; the installation of a Farrell crusher with steel conveyor to 2 grizzlies at entrance to sinter storage bins; construction of a gas producer to provide producer gas for fuel in H. & H. roasting and converting and Dwight-Lloyd sintering processes; 3 new lead blast furnaces 45x216" at tuyeres, and improvements for handling materials between sampling mill and blast furnaces. A new copper blast furnace, 42x65' at tuyeres, with arched top and flat flue, to have a capacity of 450 tons of ore (exclusive of flux) a day, with mechanical center-feed arrangements, has been constructed in place of 1 of the 5 smaller copper blast furnaces. Seven-ton electric locomotives replace the 4-ton motors previously used for hauling from storage bins and stock piles to furnace-charge bins, larger cars are in use and tunnels have been built under all bins and stock piles, to facilitate loading of cars and do away with shoveling. Other additions to plant include the installation of 1 more blower, making 7 in all in use, the new one being a No. 11 Roots, driven by two 300-h. p. induction motors. Further betterments being prepared for are the construction of 2 more 450-ton copper blast furnaces (in place of 3 smaller ones now used), and installation of an electric crane above the furnaces for handling purposes, for both feed and tapping floors.

The Trail smelter treated about 170,000 tons of ore for the first 6 months of 1913; 113,000 coming from the Rossland mines, 4,000 from the Boundary district, 18,000 from East Kootenay, 5,000 from Ainsworth, 12,000 from Slocan, 1,000 from Lardeau and 12,000 tons from United States mines.

Recent production has been as follows: 3,433,310 lbs. fine copper, 20,380,083 lbs. lead, 1,100,271 oz. silver and 69,186 oz. gold in the fiscal year 1907; 4,004,468 lbs. copper, 32,157,139 lbs. lead, 2,224,888 oz. silver and 121,380 oz. gold in 1908; 4,637,631 lbs. copper, 43,675,077 lbs. lead, 2,443,475 oz. silver and 114,920 oz. gold in 1909; 5,974,959 lbs. copper, 42,368,816 lbs. lead, 2,162,406 oz. silver and 137,614 oz. gold in 1910; 4,421,988 lbs. fine copper, 24,026,015 lbs. lead, 1,458,758 oz. silver and 119,067 oz. gold in 1911; 2,914,181 lbs. fine copper, 26,072,074 lbs. lead, 1,765,992 oz. silver and 129,789 oz. gold in 1912. Considering that the Centre Star and War Eagle mines were reported worked out, when taken over, the company has made a signal success. The management is enterprising and thoroughly competent.

CONSOLIDATED NEVADA-UTAH CORPORATION **NEVADA**

Office: care Trippe & Co., 25 Broad St., New York. Mines at Pioche, Nev., and Frisco, Utah. Chas. H. Clarkson, pres.; Victor I. Cummonck, treas.; G. H. Lippitt, sec.; Jos. W. Kay, C. A. Strouse, F. A. Dillingham, Wm. B. Randall, directors. H. R. van Wagenen, mgr. Organized 1913, under laws of Virginia, capitalization \$6,000,000, shares \$3 par; issued, \$3,-

315,000; in treasury, \$150,000; reserved for bond redemption, \$900,000; bond issue, \$900,000, first mortgage, 6%; 481,000 issued.

Company is a reorganization of the Nevada-Utah Mines & Smelters Corporation, which went into bankruptcy in 1912 and whose holdings were sold under judgment proceedings for \$100,000 to the new company. Stockholders in the old company who subscribed 50 cts. in cash for each share held and deposited their old stock, received bonds for the cash paid by them and 200 shares of stock in the new company for each \$100 subscribed. The new company starts out with \$390,000 in the treasury after paying about \$230,000 for debts and \$130,000 for reorganization expenses.

Company owns 3 distinct groups of mines, through control of subsidiary companies. The Pioche group located at Pioche, Lincoln county, Nev., includes several productive mines that are largely developed. The Imperial group at Frisco, Beaver county, Utah, including the Comet mine and the Last Chance at Bingham, Utah, are also owned.

The Pioche property is operated by the Amalgamated Pioche Mining Co., of which Mr. W. J. Palmer, of Trippe & Co., is president; 80% of the stock is owned by the Consolidated Nevada-Utah. The Pioche Consolidated group comprises 38 claims, 33 patented, also 51 town lots and 1,528 acres miscellaneous lands. The mines at Pioche (formerly owned by the Pioche Con.) include silver-lead properties that were large producers, 1870 to 1876, and suspended operations 1893, being popularly credited with a past production of \$20,000,000 gross, which probably is a high estimate. The May Day mine of this group has a 1,100' shaft and there are 2 shafts on the Yuba mine adjoining. The Meadow Valley claim has a 400' three-compartment incline shaft. The old Independence shaft is said to show a 40' body of sulphide ore between the third and fourth levels. Equipment at this group includes a 700' Leschen aerial tramway, from the May Day shaft to ore bins on the company's railway, running from the mine to Pioche. The Pioche group has steam power and a 4-drill air compressor.

The Half Moon group of 6 claims, area 42 acres, lies 1½ miles west of Pioche. It is understood to be the policy of the new company to lease the upper levels and develop the deeper workings itself. Leasers are now mining and shipping about 20 to 25 cars of ore a month. The company will work the Black Ledge, sinking the No. 1 shaft 200' and drifting 600' to reach the orebody which shows valuable ore on the 1,200' level. This orebody was worked 30 years ago, but the zinc contents made it unsaleable, whereas today there is a ready market for the ore. The Jack Rabbit group is connected with the Pioche by a 20-mile narrow-gauge railway, and Pioche is connected with the San Pedro railroad by a 28-mile branch line known as the Caliente & Pioche, completed 1907.

Holdings in the Jack Rabbit district, 15 miles west of Pioche, are 5 patented claims, area 115 acres, including the Bristol, Day and Onondaga mines. The Day mine, developed by a tunnel with 1,300' back, showing ore said to carry 2.5% copper, 2.17 oz. silver and 0.06% gold, has long been considered a valuable property, only needing development to make it a profitable producer. Both the Bristol and Day mines are operated by the Day-Bristol Consolidated Mining Co., 48% of whose stock is owned by the Consolidated Nevada-Utah.

The Imperial group near Frisco, Beaver county, Utah, is a copper property formerly owned by the Imperial Gold & Copper Mining Co. It was purchased at a judgment sale by the old Nevada-Utah to satisfy its claim of \$100,000 against the Imperial Co. Property is developed by tunnels showing carbonate ores. The Comet mine, belonging to the Nevada-Utah Mining Co., a single claim, adjoining the Cactus, is said to carry a continuation

of the Cactus orebodies of the Newhouse Mines & Smelters Co. The mine has a single shaft of 300' depth, sunk on gossan carrying about 1% copper. Former company planned crosscutting on the 300' level to develop an orebody said to carry 3.5% copper, though mainly of concentrating grade, with small silver and gold values. The adjoining Cactus mine is opened by a 6,000-ft. tunnel and the development of the Comet would necessitate an even longer tunnel or an extensive aerial tram.

The Consolidated Co. also owns all the capital stock of the Pioche-Pacific Railroad Co., and all the capital stock of the Manhattan Copper & Gold Mining Co., comprising the Manhattan group of 7 unpatented mining claims situated in the Highland mining district about 10 miles westerly from Pioche, and the Telephone claim, situated in the Ely mining district, Lincoln county, Nev.

CONSOLIDATED SONORA MINES CO.

MEXICO

C. P. Shaver, sec., care Bank of Thibodaux, Thibodaux, La. Operating office: Douglas, Ariz. Mine near Fronteras, Sonora, Mex. Jas. Beary, pres.; Chas. P. Shaver, sec.-treas.; Chas. McHenry, supt. Capitalization \$3,500,000, shares \$1 par. Is a close corporation. Lands, 1,140 hectares, slightly timbered, on both sides of the Fronteras river, about 25 miles southeast of Douglas. Property shows numerous outcrops of ore carrying lead, silver and gold.

Development on the Mary L. claim includes a crosscut tunnel, intersecting a vein at 425' and a 325' shaft sunk at this point on the vein, is all in ore with 125' of drifting on the 50' level and a 430' drift on the 300' level. Shipments to the Douglas smelter, though profitable, did not pay mining and development costs and mine was closed down, Jan., 1913, on account of repeated depredations at the property and danger to the men from the revolutionary disturbances.

CONS. UNITED VERDE JR. MG. COR.

ARIZONA & COLORADO

Office: Old Orchard, Me. Letter unclaimed at former mine office, Jerome, Yavapai Co., Ariz. Daniel L. Dean, pres.; F. A. Sidelinger, sec.-treas. Capitalization \$2,000,000, shares \$1 par. Lands are the Lucile group in the Wisconsin district of Gilpin county, Colo. Arizona lands were lost. In debt, idle many years and apparently moribund.

CONSTITUTION CONS. COPPER MINES.

NEW MEXICO

Office and mine: Lucero, Mora Co., N. M. Jas. R. Pitcher, pres.; R. Pitcher Woodward, vice-pres. and sec.; F. M. Andrus, treas., at last accounts. Organized April 24, 1906, under laws of Maine, capitalization \$3,000,000, shares \$1 par.

Lands, 400 acres, showing 3 parallel beds of mineralized slate or arenaceous shale, having an approximately N.-S. strike, beds being 3 to 8' in thickness, carrying impregnations of malachite, chalcocite and bornite, occasionally weighing pounds, but occurring more commonly in masses of a few grains up to several ounces in weight. Beds are nearly vertical and are interbedded with limestone and arcose sandstone, the cupriferous shales containing both calcium carbonate and organic matter in appreciable quantities, probably accounting for precipitation of the copper ores. Ore is said to assay 3 to 20% copper, with net claimed average of at least 5% copper and \$1 to \$2 gold per ton, this estimate probably being too high. Development is by numerous pits and trenches, and by shafts of 230' and 325'. Management is composed of men of good business and professional standing, but lacking in mining experience. New Mexico has thousands of square miles of Permian red beds, carrying small percentages of copper, mainly of unworkable tenor. Idle several years.

CONSTITUTION MINE.

Office and mine: Campo Seco, Calaveras Co., Cal. C. Borger, owner. Lands, 3 claims, also mineral rights to sundry adjoining property. Development is by a 400' shaft, on the Constitution claim, showing patches of good ore, also a 45' shaft, showing a 4' vein of ore similar to that of the Penn mine, assaying 15% copper, with small values in silver and gold. Idle several years.

CONTACT CONSOLIDATED COPPER CO.**MONTANA**

Idle. Mine office: Bailey Blk., Helena, Lewis & Clark Co., Mont. H. C. Hoffman, pres.; E. T. Kemper, sec.; H. Topel, treas.; N. H. Graeniling, supt., at last accounts. Organized Aug. 19, 1907, under laws of Nevada, capitalization \$500,000, shares \$1 par, nonassessable. Lands, 3 claims, in Colorado gulch, having about 300' of workings, including a 60' shaft showing auriferous copper ore from surface. Equipment includes gasoline power. Several small shipments were made, 1907.

CONTACT COPPER CO.**MICHIGAN**

Office: 70 State St., Boston, Mass. Mine office: Houghton, Mich. Harry F. Fay, pres.; C. J. Morrissey, sec.-treas.; preceding officers, John C. Watson, W. L. Frost and John G. Stone, directors. Organized May, 1910, under laws of Michigan, capitalization \$5,000,000, shares \$25 par; paid in \$2; issued 111,125 shares. Company is a reorganization of the Elm River Copper Co., whose shareholders were given the privilege of exchanging their stock for shares in the Contact Copper Co. on the basis of share for share, on condition that they subscribed for additional shares, at \$2 each, to the extent of 50% of their holdings in Elm river.

Lands, 2,300 acres, in Sec. 6, T. 52 N., R. 35 W., Sections 1, 2, 11 and 12, T. 52 N., R. 36 W., and Sec. 36, T. 53 N., R. 36 W.; also a mill site in Sec. 30, T. 54 N.; R. 36 W., and an option on 800 acres in Sec. 12 and 13, adjoining the old Elm River tract on the southeast.

Nearly a complete cross-section has been secured by upwards of 10,000' of diamond-drill borings, despite the heavy overburden on nearly all of the tract. Borings have given cores carrying copper, in variable quantities, from a number of different beds.

No. 1 hole, drilled vertically, in the extreme southeast quarter of Sec. 13, was stopped after penetrating the eastern sandstone for 500'. No. 2 hole is about 1,500' northwest of No. 1 and No. 3 is near the center of Sec. 13. Nothing of value has been disclosed in the territory overlying the eastern sandstone, and it seems evident that the so-called Lake and Adventure beds do not cross the Elm River tract, unless at very great depth, as the last crosscut from the Elm River exploratory shaft to the eastern sandstone did not disclose these beds.

Considerable sinking and drifting was done by the old company, on several copper-bearing beds, at different points. Shafts No. 1 of 800' and No. 2 of 200' are on the Winona bed. No. 3 shaft, 100', and No. 4 shaft, 50', are on the Shawmut bed. No. 5 shaft was sunk on an unidentified lode, located by diamond drill. No. 1 shaft, the first shaft started, was abandoned at 100', but was reopened, 1903. No. 1 shaft is 9x14' in size, sunk in the footwall of the Winona amygdaloid, at an angle of 72°. Crosscuts and drifts on the 500' level show a 35' amygdaloid carrying copper in unpayable quantities. On the 800' level north and south drifts showed a healthy bed of 12 to 16' width, but no profitable ground was opened there. In cross-cutting west from the Winona bed 12 other cupriferous amygdaloids were cut, but none were found of commercial value.

In 1907 the equipment was moved from No. 1 shaft to a new site, about 2,000' east of the Winona bed, and No. 7 shaft was started, in virgin

territory, to open an unidentified stratum, from which a core showing copper had been secured, some years previously.

The vertical exploratory shaft in search of the Lake bed, begun 1908, is about 1 mile northeast of the former workings, being located north of the center of the S. E. $\frac{1}{4}$ of Sec. 11, somewhat west of the hypothetical horizon of the Lake bed. This was sunk vertically, 200', and a crosscut sent 800' to the eastward limits of the property, without finding anything of value, though a little drifting was done, 1910, on a bed cut by the crosscut.

Equipment includes a duplex hoist good for 1,000', 2 Burt marine boilers and a 4-drill air compressor. Water is taken from a dam by a Blake pump. Buildings include a 40x40' carpenter shop, a 28x65' two-story warehouse, a boarding house with accommodations for 100 men, a school house and a number of dwellings.

The company decided, Aug., 1913, to sell the timber on its 2,400 acres to provide funds for further work. Though diamond drilling has not as yet disclosed any lode of value, the 16 holes so far put down do not by any means exhaust the possibilities of the property.

CONTACT MINING CO.

OREGON

Mine office: Lostine, Wallowa Co., Ore. Lands, on the south fork of the Wallowa river, connected by wagon road with Lostine, show auriferous and argentiferous copper ore, with quartz gangue, also free gold in quartz. Idle several years.

CONTINENTAL COPPER & GOLD MINING CO.

ARIZONA

Office: 330 Security Bldg., Los Angeles, Cal. Jas. R. Haddock, pres.; Coyle J. Tracy, vice-pres.; Herbert T. Muzzy, sec.; Fred Knobloch, treas.; Edw. S. Osborne, gen. mgr.; preceding officers, John Breiner and J. F. Halsted, directors. Organized June, 1905, under laws of Arizona, capitalization \$1,000,000, shares \$1 par, nonassessable; issued, \$900,000. Annual meeting, first Saturday in November.

Lands, 6 claims, unpatented, 120 acres, in the Seneca district, showing slates, schists and limestones, with igneous intrusives, said to carry 12 fissure veins and contact deposits, of which one, of 8' estimated average width, traceable 1,500', has been developed by an 145' shaft, a 429' crosscut tunnel, and 20' and 129' drift tunnels, with 700' of workings, showing occasional oxidized ores, estimated to average 10.87% copper and \$4 gold per ton. Idle several years, except for annual assessment work.

CONTINENTAL COPPER MINING & SM. CO.

SOUTH DAKOTA

Address: care W. J. Booth, receiver, Lima, Ohio. Company organized as successor of the Continental Copper Co. and Dakota-Calumet Co., now reorganized as Dakota Continental Copper Co. and property described under that title.

CONTINENTAL MINES DEVELOPMENT CO.

CALIFORNIA

Office: 301 First National Bank Bldg., Riverside, Cal. Harwood Robins, pres. Organized 1911, as a holding company, capitalization \$500,000, shares \$1 par. Controls the Ironwood Mountain Copper Co., elsewhere described.

CONTINENTAL MINES, POWER & REDUCTION CO.

COLORADO

Office: 401-2 First National Bank Bldg., Denver, Colo. Mine office: Yankee, Clear Creek Co., Colo. Henry I. Seemann, pres. and gen. mgr.; Frank R. Baker, vice-pres.; Wm. H. Warinner, sec.-treas. Organized Nov. 7, 1905, under laws of Colorado, capitalization \$5,000,000, shares \$1 par, nonassessable; issued, \$4,200,000. Annual meeting, first Wednesday in November.

Lands, 180 claims, 2,000 acres, including 7 mill sites, in the Lincoln

district, showing gneiss, schist and granite, with porphyry dikes, claimed to carry 75 fissure veins and contact deposits, with quartz gangue, with reported width of 3 to 300', the vein system being said to be traceable 4 miles. Ores are sulphides, reported by management to carry 1 to 16% copper, 3 to 35% lead, from a trace to 6% zinc, 1 to 300 oz. silver and \$5 to \$500 gold per ton. Development is by shafts of 135', 150' and 200', and by a number of tunnels, of 100 to 2,000', and the Seemann tunnel of 3,636', which is planned to be the longest crosscut tunnel in Colorado, to give a 5,000' back. The mine has about 4 miles of workings, with about 1 mile in ore, estimated by management to show 300,000 tons of ore blocked out for stoping.

Equipment includes steam power and a hydro-electric plant, with 150 h. p. at mine and 150 h. p. at mill. Machinery includes a 25-h. p. hoist and 7-drill Sullivan air compressor. There are about 20 buildings, including a 16x25' machine shop, 5 smithies, 3 boarding houses and 12 dwellings.

The 50x150' frame mill, with iron roof and siding, has 20 quick-drop gravity stamps, one 8x12" Blake crusher, 3 Card tables, 3 Wilfley tables and 2 sizers. Company plans continuous development, and selling commercial current.

CONTINENTAL MINING CO.

MEXICO

Office: San Antonio, Tex. Mine office: Monclova, Coahuila, Mex. Otto Koehler, pres.; Otto Wahrmund, vice-pres. and gen. mgr.; N. G. Newton, sec.; Arthur L. Tuttle, gen. supt. Organized April, 1905, as a reconstruction of Continental Copper Co., capitalization \$1,000,000, shares \$10 par. Is closely allied in ownership and management with the Jimulco Mining Co. Owns the Panuco mine with 65 hectares, opened in 1700 and worked at intervals since. Property was bought from the Panuco Copper Co., under whom it was badly mismanaged. Ore deposit is a chimney of breccia, cemented by metallic sulphides, mainly chalcopyrite, but with a little chalcocite, in a quartz gangue, the country rock being granitic. The ore is reported to average about 3½% copper.

Property includes a 40-mile railway, from Monclova to Panuco, costing \$350,000, having 3 locomotives. Old company invested about \$1,000,000 in the property and improvements. Largest production, under former ownership, was 1,466,059 lbs. fine copper in 1902, and a small production was secured, July-Nov., 1907, by present company, estimated at 1,250,000 lbs. copper. Mine considered promising, though low in grade, and management good. Closed down, 1913, on account of danger to life and property by revolutionary bands.

CONTINENTAL-MORRIS COPPER MINING CO.

WYOMING

Office: 111 East Main St., Morris, Ill. Mine near Encampment, Carbon Co., Wyo. S. H. Matteson, pres.; J. H. Rogers, vice-pres.; Dr. G. A. Leach, sec.-treas.; preceding officers, J. F. Hatcher, U. C. Davis, W. A. Thomas and E. R. Joyce, directors. Organized March 31, 1908, under laws of Wyoming, as a merger of the Continental Copper Mining Co. and Morris Mining Co., capitalization \$2,250,000, increased later to \$5,000,000, shares \$1 par, nonassessable; issued, \$1,750,000. Annual meeting, first Tuesday in February.

Lands, 7 claims, patented, area 120 acres, in the Battle Lake district, carrying about 50 acres of good pine timber. Property shows schist, with 4 veins, of 13 to 40' estimated average width, traceable 1,500 to 3,000', carrying carbonate and sulphide ore, estimated to average 1 to 8% copper, with small gold and silver values. Development includes discovery shafts of 10 to 30' depth on each claim, a 165' shaft, and tunnels of 900', 226', 320' and 250'. The shorter tunnel on the Gossan Lead, shows impregnations of

copper carbonates. Equipment includes a steam hoist, good for 500', and 2 buildings. Idle.

COOKE MINING & REDUCTION CO.

MONTANA

Office and mine: Cooke, Park Co., Mont. E. C. Engelhardt, supt. at last accounts. Property is developed by tunnels, showing auriferous and argentiferous copper ores. Has a small steam plant. District is remote from transportation, being on northeast border of the Yellowstone Park, has been further handicapped by stock-selling promotions and a lack of well-planned mining development, for 25 years past. Unfavorably regarded. Presumably idle.

COPELAND MG. & DEVELOPMENT CO.

BRITISH COLUMBIA

Mine office: Bridesville, Boundary district, B. C. Lands, known as the Le Roi group, on the West Fork, near Bridesville, are held under a 2-year bond and lease. Property has a vein of 90' claimed width, developed by a 65' shaft, showing auriferous and argentiferous copper ore. Presumably idle.

COPETE CONSOLIDATED COPPER CO.

MEXICO

Office: 15 William St., New York. Mine office: Francis C. Nicholas, mgr., El Copete, via Carbo, Sonora, Mex. F. C. Hanford, vice-pres.; Myra B. Martin, sec.-treas.; preceding officers, Ralph Melcer and Jas C. Bayles, directors. Organized March, 1906, under laws of West Virginia, capitalization \$1,000,000, shares \$1 par, nonassessable; issued 541,170½ shares. Annual meeting, first Wednesday in March.

The company was organized to develop the property formerly owned by the Copete Mining Co., under an agreement with that company, title to the property being vested in the Melcer Mining Co., legalized in Mexico, and the entire stock issue of which is held by the Copete Consolidated Copper Co.

Lands, 140 pertenencias, comprising the San Miguel, Jalisco, Santiago, Good Hope, Copperosay and El Copete claims, and sundry adjoining properties, giving a total area of about 500 acres, show an immense gossan capping, apparently the remnant of a great blanket vein, the greater part of which has been eroded away.

Development is by several tunnels and a 615' shaft with about 7,000' of workings. Ores are mainly gold with considerable iron pyrites and some copper, giving average assay values of \$6 per ton. The bottom of the ore zone seems to have been reached at about 300'. Company working about 5 men in summer of 1913, the new work reported to show high-grade glance ore that is sacked and shipped. The Copete orebody is said to be 150x225' and to average 3% copper, 2½ oz. silver and \$4 gold per ton.

Company has been badly mismanaged in the past and the promotion work and financial juggling scandalous, but the property has merit, though not considered especially promising.

COPETE MINING CO.

MEXICO

Office: 15 William St., New York. Myra B. Martin, sec. Organized 1900, under laws of West Virginia, capitalization \$5,000,000, shares \$5 par. Property, consisting of stock of the Melcer Mining Co., was transferred, 1906, to Copete Consolidated Copper Co., under an agreement which practically gives both companies an undivided half interest in the property. Described under title of Copete Consolidated Copper Co.

COPPER ACRES MINING CO.

NEVADA

Idle. Office: Salt Lake City, Utah. Mine office: Golconda, Humboldt Co., Nev. Jas. T. Hammond, mgr., at last accounts. Lands, near Battle mountain, 10 miles north of Bannock, show a vein of 40' claimed

width at surface, said to carry 15 to 20' of ore averaging about 8% copper and 10 to 15 oz. silver per ton, which figures are entirely too high to be credited. Ore has given assays up to 41.61% copper and 22.2 oz. silver per ton. Mine is opened by a short crosscut tunnel.

COPPER AGE & EDISON MINING CO.

MONTANA

Idle. Chas. J. Heidenreich, Spokane, Wash., pres.; Morton Webster, Wallace, Idaho, sec.-treas.; L. N. Hyde, supt. Organized 1906, under laws of Washington, capitalization \$250,000. Lands, 12 claims, 4 miles south of Saltese, are an eastern extension of the Richmond mines, carrying extension of copper-bearing outcrop of that mine the vein paralleling the Monitor. The vein is exposed for some 700' in the tunnel just east of the divide; it averages 10' thick, is nearly vertical and carries a very little chalcopryrite and chalcocite in a siderite gangue.

Development includes a main 1,160' crosscut tunnel, with back of 600' showing sulphide ore assaying up to 30% copper and \$14 gold per ton.

COPPER AGE MINING & SMELTING CO.

WYOMING

Idle. Lands, 12 claims, about 2 miles north of Battle, on the Penn-Wyoming tram line. The 300' Copper Blossom shaft, sunk on a quartz vein, showing a little ore at and near surface, is said to have a fair showing of concentrating ore below depth of 200'. Equipment includes several mine buildings.

COPPER BALL MINE.

MONTANA

Office: St. Regis, Missoula Co., Mont. Gustave Wolf, Ole Nore, Wm. Linter and Charles Pfeur, owners. Property, 4 claims, 3½ miles north of St. Regis, in Mullan gulch, is developed by an 850' tunnel, with about 260' of workings, showing an 11' vein of chalcopryrite said to average 5 to 20% copper. Idle several years.

COPPER BANK MINING CO.

UTAH

Mine office: Brighton, Utah. C. E. Street, pres.; J. L. Perkes, sec.-treas. Organized 1911, under laws of Utah, capitalization \$25,000, shares 5 cts. par; issued, 250,000 shares.

Lands, 6 claims, nearly 4 miles west of the old Maxfield mine, in the Big Cottonwood district, show 4 distinct porphyry dikes carrying low-grade copper ore in veins ranging from 20 to 100' in width. Development is by a short tunnel, showing a small quantity of ore. No returns secured.

COPPER BAR MINING CO.

WYOMING

Office: 206 Burr Blk., Lincoln, Neb. Mine office: Saratoga, Carbon Co., Wyo. W. J. Crane, pres.; Geo. E. Hibner, sec. and gen. mgr., at last accounts.

Property includes the original holdings, now idle, on Cow creek, near Rudefeha and the Charter Oak group of 14 claims, 5 patented, on California creek, about 16 miles southwest of Saratoga, bought, 1908.

Development on the Charter Oak mine includes 2 incline shafts of 317' and 352' with 6 levels opened and about 2,200' of workings. The main shaft was sunk at right angles to the vein, which has a dip of 52°. The ore deposit has a shallow oxidation zone, succeeded by sulphides in a schistose gangue formerly claimed to average 12% copper, several ounces of silver and \$6 gold per ton with upward of 300,000 tons of ore blocked out, which was a gross misstatement.

Equipment includes steam power and a little ore was shipped, 1907. Property considered promising.

COPPER BASIN MINING & MILLING CO.

NEVADA

Office: D. F. Walker Bldg., Salt Lake City, Utah. Mine near Battle Mountain, Lander Co., Nev. L. G. Hardy, pres.; W. H. Brammel, sec.-treas.; preceding officers, C. W. Knudson and T. N. McCauley, directors.

Wm. Burge, supt. Capitalization \$30,000, shares 10 cts par, nonassessable; issued 270,000. Annual meeting, second Monday in January. Property, 6 claims, 120 acres, in the Battle mountain district, 10 miles west of Battle mountain, shows veins in quartzite with orebodies along the line of the limestone-quartzite contact. The veins vary from 1 to 4' in width and carry $1\frac{1}{2}\%$ copper, 8 to 15% lead, 7 to 12% zinc, 5 to 15 oz. silver and \$1 in gold. Vein runs northwest, with dip of 70° . Development consists of 1,200' of work including a 150' shaft and 300' tunnel with 2 other shafts and 2 tunnels. Management estimates 1,000 tons of ore blocked out.

Equipment as yet only a whim, but a concentrating plant is planned. Production for 1912, 80 tons of \$25 ore.

COPPER BELL MINING CO.

UTAH

Idle. Office: 120 West Second South St., Salt Lake City, Utah. J. W. Duffield, pres. and gen. mgr.; Wm. Crabbe, sec.; Alonzo Young, treas. Organized 1907, under laws of Utah, capitalization \$50,000, shares 10 cts. par. Lands, 8 claims, unpatented, in the Newfoundland mountains, 7 miles from a railroad, having a 75' shaft, and short tunnel, showing lead and copper ores, said to carry 16.96% copper, 14.7% lead and 1.2 to 1.7 oz. silver per ton. Had a small force engaged, 1911, extracting ore for shipment.

COPPER BELL MINING & MILLING CO.

UTAH

Idle. Office: Springville, Utah. Mine office: Ibapah, Tooele Co., Utah. John P. Anderson, pres.; T. R. Kelley, sec.-treas., at last accounts. Organized 1906, capitalization \$50,000, shares 25 cts. par. Lands, 7 claims, patented, in the Deep Creek district, with principal development on the Paragon and Venus claims. Mine has a 150' shaft, showing ore assaying up to 3% copper, 16 oz. silver and \$4 gold per ton, and also has gold-bearing quartz, silver-lead ores and ores of tin, nickel and molybdenum.

COPPER BELL MINES CO.

WYOMING

Office: 135 Adams St., Chicago, Ill. Mine office: Lusk, Converse Co., Wyo. Edwin Hall, pres. and mgr.; J. L. Harris, sec., at last accounts. Organized June 25, 1906, under laws of Wyoming, capitalization \$2,000,000, shares \$1 par. Company owns a controlling interest in the Lucky Strike Mining & Smelting Co.

Property, held under bond and lease, includes the old Michigan mine, and about 600 acres of mineral and timber lands, in the Rawhide Buttes district, 12 miles south of Lusk, latter showing 4 parallel veins, 2 traceable nearly a mile. This property is developed by a 640' shaft, and a 525' tunnel, with about 4,000' of workings, showing copper carbonates and sulphides, disseminated in limonite, giving assays of 3 to 60% copper, with small silver values, and \$1.40 to \$12 gold per ton.

The Michigan mine, in Muskrat canyon, has shallow workings in a wide vein from which about \$100,000 in ore was taken in earlier operations and is now to be developed by a shaft planned to sink 500'.

Equipment includes a 54-h. p. Fairbanks & Morse gasoline engine, good for 1,500', and a 5-drill air compressor, a machine shop, smithy, engine house and sundry mine buildings. A small shipment of copper ore was reported made, 1912, and company early in 1913 was working a small force. Not regarded favorably by the late Horace J. Stevens.

COPPER BELLE MINE.

ARIZONA

Owned by Leonard Copper Co., at Gleeson, Cochise Co., Ariz.

COPPER BELT MINING & DEVELOPMENT CO.

NEVADA

Office: Ludwig, Lyon Co., Nev. C. W. Walker, supt.; I. H. Baird, pres. Owns the Baird mine, or group of claims in Mason Pass section of Yerington district, showing a 3' vein of ore developed by a 200' incline

shaft on the vein. Plans drifting on 200' and 400' levels to get beneath the ore shoot shown on the 100' level of the Blue Jay mine.

COPPER BLOCK MINE.**MONTANA**

Idle. Property, 4 miles east of Basin, Jefferson Co., Mont., in High Ore gulch, is developed by several short tunnels, showing auriferous and argentiferous copper and lead ores.

COPPER BLUSH MINING CO.**COLORADO**

Mine office: Jamestown, Boulder Co., Colo. S. C. Bashor, pres., at last accounts. Lands, on Longfellow hill, show milling ores claimed to carry stringers of high-grade copper telluride. Idle.

COPPER BOTTOM MINING & MILLING CO.**WYOMING**

Office: Inez, Converse Co., Wyo. Henry Metz, Sr., pres.; Fred Metz, sec.-treas. Property is the Green Hope mine, in the Hartville district, Laramie county, under bond and lease until 1916, to Messers. Wm. F. Moenke and Geo. Botsford, Sunrise, Wyo. Mine has produced about 125 tons of ore. Company also owns a few copper claims in the region at the head of Broom creek, 15 miles north of Sunrise in Sec. 26, T. 29 N., R. 65 W., on which annual assessment work has been done.

COPPER BOY MINING CO.**COLORADO**

Office: care Clyde C. Dawson, Canyon City, Colo. Organized 1906, under laws of Colorado, capitalization \$50,000. No trace of operations securable.

COPPER BULL MINING CO.**COLORADO**

Address: Lock Box 507, Pueblo, Colo. Unfavorably regarded. See Vol. X.

COPPER BULLION MINE.**NEW MEXICO**

J. W. Searle, owner and superintendent, Organ, Dona Ana Co., N. M. Property shows a copper deposit developed by tunnel work only. Is a prospect as yet.

COPPER BULLION MINING CO.**UTAH**

Mine office: Santaquin, Utah Co., Utah. J. N. Christensen, pres.; Robt. Anderson sec.; P. P. Hindmarsh treas. Organized 1907, capitalization \$1,000,000, shares \$1 par. Lands, 13 claims. Idle and apparently moribund.

COPPER BUTTE MINES.**ARIZONA**

Idle. Office: 9 High St., Minneapolis, Minn. Operating office: Phoenix, Ariz. Ace P. Abell, pres.; Wm. H. Lucia, vice-pres.; Frank A. Bates, sec.; Henry A. Blume, treas.; preceding officers and Capt. Harry Roberts, directors; P. P. Parker, agent. Organized July 21, 1900, under laws of Arizona, as the Arizona Copper Mountain Mining Co., and name changed, June, 1904, to present title; capitalization \$6,000,000, shares \$10 par,

Lands, 16 claims, 8 patented, about 320 acres 4 miles northwest of the Ray Consolidated, in the Walnut Grove or Mineral Creek district, 2½ miles north of the Gila river, with a good wagon road to the Phoenix & Eastern railway. Property was worked, 1879-81, on a small scale, for silver.

Lands lie in a mountainous tract, east of the Florence Valley, and, while near the Ray Consolidated, property more closely resembles the form of copper deposits mined by the Moctezuma Copper co. at Nacozari, Sonora, Mex. Property shows rhyolite and later dacitic lavas, rested on a surface of schist, sedimentary rocks and granite, the granite being part of a broad mass, many miles in extent, cut through by the Gila river, the Copper Butte property lying on the border of this granite batholith.

The ore deposit is a mineralized mass of breccia formed of rock fragments, being an old volcanic throat, having an abrupt contact with Ray granite on the east and west, and a nearly vertical contact with dacite. The breccia consists largely of schist, varying from dark and light gray,

pearly sericitic schist, to silicious schist, with fragments of quartz, diabase, granite and limestone. The deposit is peculiar, being part of the breccia mass that has been altered and mineralized, the only known counterparts of this surface ore being found at the Arizona-Hercules mines, 5 or 6 miles to the eastward, and at the Black Warrior mine, near Globe. Property shows extensive red areas similar in physical character to the ore, save that they carry no copper. The eastern red area of breccia shows rude bedding, with a dip of about 25° E., away from the mountain. The most promising portions of the property are an eastern tract of about 20 acres, on Copper Butte claims Nos. 2, 6 and 12, and a western tract on about 10 acres on the Junebug and Carlisle claims. The schist areas exposed show traces of copper at many points. Silicate ore is exposed at numerous points on the property, by discovery shafts, pits and trenches. Assays, made 1910, by disinterested parties, gave from 1.5% copper in lean breccia, up to 13.6% copper from the ore dump, at the Black Oxide pit.

Development consists of a 300' incline shaft which passes out of the ore, by numerous shallow surface workings in ore and 6 tunnels, 2 longest being 175' and 300', mine having a total of about 2,000' of workings. Principal shafts are the 175' James incline, and the 2-compartment vertical Wallace shaft. The oxidized and silicate ores at and near surface could be mined economically and cheaply.

Equipment includes a 60-h. p. steam plant and several buildings. Production, 1907, was 42 carloads of carbonate ore, ranging up to 19% copper tenor with small silver values and average of about 5% copper. A wagon road was being built to Ray, 1913, and property reported to be reopened. It has considerable shipping ore in the old workings, which can be profitably mined.

COPPER BUTTE MINING CO.

UTAH

Office: Richfield, Piute Co., Utah. Wm. Johnston, pres.; George Ogden, sec.-treas., at last accounts. Property is a copper prospect, on Gold mountain, in the Kimberly district, Piute Co., Utah. Development is by a short tunnel, showing a 6' vein of low-grade argentiferous copper ore. Presumably idle.

COPPER BUTTE MINING CO.

WASHINGTON

Mine office: Orient, Ferry Co., Wash. J. D. Gumper, pres.; H. J. Miller, sec.; Willis Townsend, gen. mgr. Organized Dec., 1905, under laws of Washington, capitalization \$1,000,000, shares \$1 par. Owns 4 claims, patented, in the Pierre Lake district, south of Orient, showing 2 veins in open cuts, 14' and 15' wide respectively. Development by 300' shaft with drifts on the 100' level shows copper-gold ores, but not in commercial quantity. Company plans driving a 900' tunnel, 1913, to cut the vein at a depth of 400'.

COPPER CANYON MINE.

ARIZONA

Office: Kingman, Mohave Co., Ariz.; Messrs. Connor, Lassell, Smith and Sawyer, owners. Property is in the Wallapai mountains, about 25 miles east of Yucca. Development is by short tunnel and shaft showing a vein of molybdenite, lead and copper.

COPPER CHIEF MINING CO.

ARIZONA

Mine office: Jerome, Yavapai Co., Ariz. Owned by the Hayden and Midgeon estates, Torrington, Conn., Franklin Brooks, Colorado Springs, Colo., and Arthur Hendey, supt.

Property, 23 claims, 11 patented, adjoining Senator Clark's Iron King mine in the Black Hills range, just outside the Verde district property. The orebody is 60 to 100' wide, and consists of copper-bearing iron oxide car-

rying gold, silver and a little copper, the total value being about \$6 per ton. Sulphide ores occur at and below 280'.

Development is by 400' shaft, 2,225' of work on the 100', 160', 220' and 280' levels. A crosscut tunnel, now 900' long, is being driven to connect with the bottom of the shaft. Mine reported to have a large tonnage of low-grade oxidized ore which cannot stand transportation to a distance, but can be treated at the Clarkdale (United Verde) smelter. Future of the property depends upon development of sulphide ore in quantity.

Managment claims 400,000 tons of oxidized ore and 100,000 tons of sulphide ore blocked out, with oxides averaging about 1% copper and \$10 gold and silver, and sulphides assaying 3% copper with gold and silver, giving gross values of \$11 per ton. Mine timbering is said to be in bad shape. Equipment includes an air compressor and a good hoist. A leaching plant, built some years ago, proved a failure.

COPPER CHIEF MINING CO.

MONTANA

Office: Wallace, Idaho. Mine near Saltese, Missoula Co., Mont. J. H. Taylor, sec.-treas. Capitalization \$1,000,000, shares \$1 par. Lands, 11 claims, in the St. Joe district, carrying a fissure vein in quartz, supposed to be an extension of the Bullion vein, with a strong gossan showing a little copper. Property has been tested by trenches, and prospect tunnels of 20', 30' and 40', and management planned reaching the vein at 700' by a crosscut tunnel. Idle several years.

COPPER CITY MINE.

ALASKA

Office and mine: Coppermount, Prince of Wales Island, Alaska. Lands are claims on the beach, at Cordova bay, 6 miles south of Coppermount. Has fair mine buildings, and shipped some good ore to the Crofton smelter, 1905. Idle several years.

COPPER CITY MINING CO.

NEW MEXICO

Office: Deming, N. M., Albert Shultz, Jos. A. Mahoney, N. A. Bolich, Chas. J. Kelly and Christian Raithel, incorporators. No trace of operations securable.

COPPER CLIFF COPPER MINING CO.

WASHINGTON

Office: 724 Peyton Blk., Spokane, Wash. Mine office: Chewelah, Stevens Co., Wash. T. F. Wilson, pres., treas. and gen. mgr.; J. O. Blair, vice-pres.; L. C. Dougherty, sec.; L. K. Armstrong, mg. engr. Organized Feb. 24, 1912, under laws of Washington, capitalization \$1,000,000, shares \$1 par; issued, \$62,000.

Lands, 60 acres and 40 acres timber lands, held under bond and lease, in the Chewelah district. Property shows contact deposits between altered granite and limestone. Ores are mainly copper, with small silver values. Development is by shafts of 332' and 730', and by tunnels, longest being 455'.

COPPER CLIFF MINING & MILLING CO.

UTAH

Office: Springville, Utah. No trace of operations securable. Presumably dead.

COPPER CROWN MINING CO.

IDAHO

Letters returned repeatedly from former office and mine, Mullan, Shoshone Co., Idaho. F. Albert Massing, pres.; John Hendrickson, sec. Organized Dec. 11, 1907, under laws of Arizona, capitalization \$1,250,000, shares \$1 par, as a reconstruction of the Iron Crown Mining & Milling Co. Lands, 9 claims, 1 mile from a railroad, just west of Lookout, on the head waters of the St. Regis river. Property shows, at surface, a 4' vein carrying auriferous and argentiferous copper ore, with iron and quartz gangue. Mine has a 30' shaft and 4 tunnels, with about 1,600' of workings. Idle several years.

COPPER CROWN MINING CO. OF MICHIGAN**MICHIGAN**

Office: 3558 Lindell Ave., St. Louis, Mo. Jacob Maurer, pres.; Dr. M. J. Hopkins, vice-pres.; N. J. Cashin, treas.; preceding officers, B. L. Brown, Geo. Bridenbach, Fred Balke and J. W. Byers, directors; H. B. Kirkpatrick, sec. Organized July 18, 1902, under laws of Michigan, capitalization \$2,500,000; increased, about 1911, to \$3,000,000, shares \$25 par; issued 66,200 shares.

Lands, 2,500 acres, 6 to 8 miles west of the Victoria, and 8 miles north of Matchwood, the nearest railroad point, including a number of old mines on which more or less work was done, 1850 to 1860, principal properties being the Hamilton and Norwich mines. The Lafayette mine, formerly owned, was sold, 1909, for \$14,000.

The first work of the present company was on the Hamilton, where a 602' tunnel was driven and a 270' shaft sunk on the Meads vein, the tunnel of 602' securing a back of only 300', and a shaft was sunk by mistake on a drift boulder in sandstone. Later work was at the Norwich mine, which, next to the Victoria, is the most extensively developed and promising mine west of the Ontonagon river. The Norwich tunnel is 950' long, with 1,000' of drifts that give an encouraging copper showing. The Norwich mine, worked 1850 to 1865, produced 993,360 lbs. fine copper, securing masses of native metal up to 10 tons in weight. The bed is bunchy, but shows considerable promising stamp-rock. The Meads bed was located by a series of prehistoric pits along the outcrop, the 270' shaft thereon showing a strong bed, up to 25' in width, with a 720' drift to the westward, on the fourth level.

Equipment includes a power house, pump house, tool house, smithy, barn and 9 dwellings, with 250-h. p. and 120-h. p. engine, 40-kw. dynamo, 250-h. p. boiler and 6-drill and 5-drill air compressors. Idle since 1907.

COPPER DOLLAR MINING CO.**ARIZONA**

Idle. Property is a group of claims southwest of Miami and south of the Cole-Goodwin mine, showing veins in hard schist, developed by 1,000' of work. Ore is bunchy, but of good grade, carrying 5 to 10% copper and \$3 to \$10 in gold and silver.

COPPER EAGLE MINING CO.**OREGON**

Idle. R. J. Ginn, pres.; N. P. Hansen, sec., at last accounts. Lands, in the Galice district, show a 10' quartz vein giving assays of 10 to 30% copper, opened by a tunnel of 300'.

COPPER GEORGE DEVELOPING CO.**NEW MEXICO**

Idle. Office: 82 Wisconsin St., Milwaukee, Wis. Mine office: Santa Rita, Grant Co., N. M. Lands, 12 claims. Shut down many years.

COPPER GIANT MINE.**ARIZONA**

Address: Hackberry, Mohave Co., Ariz. Wm. Neagle, supt. Property in the Brownsville district, 8 miles east of Hackberry, is under bond and lease to W. A. Clark. Development is by a 260' shaft with drifts both ways on the vein on 200' level, showing 7 to 9' silicious ore running 7% copper, compared with 4% on the 100' level. Equipment includes steam plant, hoist, compressor, etc.

COPPER GIANT MINING CO.**ARIZONA**

Office: care O. Z. Kane, gen. mgr., Tucson, Ariz. Mine office: Silver Bell, Pima Co., Ariz. Lands, 50 claims, in several different groups, lying south of the Imperial mine, and to the eastward of the Silver Bell mountains, opened by about 500' of shafts and tunnels, with a 100' shaft on the Copper Giant claim. Property shows a contact deposit with bold outcrops, between limestone and quartzite. Ore is chalcopyrite, with occasional chalcocite. Idle many years.

COPPER GLANCE MINING CO.**ARIZONA**

Idle. S. W. Clawson, pres. and treas.; A. S. Barker, sec., at last ac-

counts. Organized March, 1901, under laws of Arizona, capitalization \$2,500,000, shares \$1 par. Lands, 24 patented claims, area 480 acres, in the Warren district, about 7 miles southeast of Bisbee. Has shafts of 50', 100', 140' and 560' and tunnels of 75' and 150'. Very fully described Vol. IV.

COPPER-GOLD MINES CO.

NEVADA

W. F. Gray, superintendent, Goldfield, Esmeralda Co., Nev. Property, a lease on the Gold Bar mine near Goldfield, showing a vein with high-grade copper-gold-silver ore. Shaft 400' deep with various levels, but chief development on 200' level.

COPPER GULCH MINING CO.

CALIFORNIA

Idle. Office: 723 Boston Bldg., Salt Lake City, Utah. Mine near Cima, San Bernardino Co., Cal. W. T. Vincent, pres.; Carl Wing, vice-pres. and mgr.; A. B. Irvine, sec.-treas. Organized 1907, under laws of Arizona, capitalization \$1,000,000, shares \$1 par, nonassessable. Lands, 5 claims, unpatented, in the Cape Canyon district, developed by a 165' shaft. Closed down several years and apparently moribund.

COPPER HILL MINE.

CALIFORNIA

Office and mine: Jackson, Amador Co., Cal. W. F. Detert, owner and mgr. Lands, 2,500 acres, patented, on the Consumnes river, having a quartz-porphry dike of 500 to 600' width, with large gossan outcrop underlain by chalcopryite, associated with pyrrhotite in a 50' vein east of and parallel with the Consumnes river. The mine has the Pine Tree shaft, 90'; the Blind Pigeon shaft, 130', showing zinciferous iron and copper sulphides, with quartz gangue; the 150' Little Oak shaft; the 100' Zinc shaft; the 100' Air shaft, and the 500' Main shaft, latter on a 50' vein east of and parallel with the Consumnes river, this carrying a 2 to 4' paystreak of fine-grained massive chalcopryite, assaying 20 to 30% copper, with appreciable values in gold and silver. The shaft has an 8x12" double-cylinder steam hoist. The mine has about 3,000' of workings. Buildings include several shops and dwellings. Mine was worked, 1861 to 1881, securing a considerable production, as is evidenced by extensive slag dumps. Idle since 1881.

COPPER HILL MINES CO.

NEW MEXICO

Mine near Orogrande, Otero Co., N. M. Dr. Jacob Geiger, pres.; Sterling Price Smith, sec.-treas., at last accounts. Organized 1907. Lands include the High Five and Red Hill groups, latter, of 4 claims, said to have a fair surface showing of auriferous and argentiferous copper ore, opened by a 140' shaft. Inactive several years and apparently moribund.

COPPER HILL MINING CO.

COLORADO

Office: La Plata, La Plata Co., Colo. E. N. Beach, owner and mgr. Property is a copper and gold mine in Bed Rock gulch, showing the Esmeralda and Copper Hill veins, developed by several tunnels and reported to be mining and shipping copper ore, Sept., 1913. Will install power plant in 1914 and plans tram line.

COPPER HILL MINING CO.

UTAH

Controlled through stock ownership by Bingham-Butte Copper Co., and described under that title.

COPPER HILL MINING CO., LTD.

MONTANA

Idle. Office: Wallace, Idaho. Mine near Quartz, Missoula Co., Mont. Morton Webster, pres.; A. T. Ryan, vice-pres.; P. L. Eberhardt, sec.-treas.; preceding officers, Howard K. Welch and Jas. Howarth, directors. Organized March, 1908, under laws of Montana, capitalization \$250,000, shares 25 cts. par, nonassessable. Lands, 7 claims, area 125 acres, in the Sunrise district, on the Montana side of the Montana-Idaho divide, showing an altered zone of highly silicious rocks of 25 to 50' width, carrying fine dissemina-

tions of copper carbonates and sulphides. Mine has a 75' tunnel, showing ore said to be somewhat similar to that of the Snowstorm, and assaying about 4% copper.

COPPER HOARD MINING CO.

WASHINGTON

Office: Chewelah, Stevens Co., Wash. O. A. Campbell, F. M. Jarvis and Chas. Adams, incorporators. Property is the Lookout claim, formerly owned by Col. G. F. Belcher, adjoining the United Copper mine. Company planned diamond drilling, April, 1913.

COPPER INDEPENDENT CONS. MG. CO.

WASHINGTON

Formerly, at Silverton, Snohomish Co., Wash.

Defunct. Judge Chas. B. Wheeler, Buffalo, N. Y., trustee for the bondholders, foreclosed on the Independent mine, near Silverton, and other property, 1907, and is now the principal owner. The mill and Stellaguamish River claims were previously sold to the Eclipse Consolidated Mining & Investment Co. Described Vol. VI.

COPPER JACK MINING CO.

UTAH

Office: Eureka, Utah. C. C. Griggs, pres. and gen. mgr.; W. P. Carter, vice-pres.; Laurence Blackett, sec.-treas.; preceding officers, J. V. N. Door, Herman Hoesch, Geo. Hanson and A. H. Pettis, directors. Organized 1905, under laws of Utah, capitalization \$100,000, shares 10 cts. par.

Lands, 24 claims, 10 patented, area 480 acres. 40 miles west of Eureka, in the Erekson district. Property has a 30" fissure vein in granite, with a paystreak carrying oxidized ores, and sulphides, associated with pyrite, in quartz gangue, giving assays of 13 to 35% copper, with small gold and silver values. Mine has shafts of 30' and 240' and a short tunnel.

COPPER KEY MINES, INC.

WASHINGTON

Office: Spokane, Wash. Mine office: Republic, Ferry Co., Wash. S. S. Bailey, pres.; T. A. Russell, vice-pres.; J. L. Prickett, sec.-treas.; preceding officers, T. E. McBroom and D. G. Russell, directors. Organized under laws of Washington. Lands, 7 claims, 1 fractional, on Belcher mountain, adjoining the Oversight group on the north, having a 145' shaft and 3 tunnels, longest 571' showing low-grade auriferous chalcopryrite, of 1 to 3% copper tenor, associated with pyrite, marcasite, hematite and magnetite. Equipment includes a 7-drill air compressor. Property, though low in grade, is considered promising.

COPPER KING CONSOLIDATED MINING CO.

COLORADO

Office: care Milo A. Smith, Denver, Colo. Organized April, 1903, under laws of Colorado, capitalization \$300,000.

Lands, in Jefferson and Park counties, have undergone considerable development, but ore, as developed, is too low in grade to be workable. Idle many years and apparently moribund.

COPPER KING GOLD & COPPER MINING CO.

NEVADA

Mine office: Mizpah, Elko Co., Nev. Made a few shipments of auriferous and argentiferous copper ore, claimed to average about \$100 per ton in value, during latter half of 1907. Inactive several years and apparently out of business.

COPPER KING MINE.

ARIZONA

Mine at Bisbee, Cochise Co., Ariz. Lands, 10 claims, adjoining the Copper Queen, Calumet & Arizona, known as the Arizona King group, formerly held jointly by Union Mines Co., which owned about a 60% undivided interest, and R. E. Brotherton, Peter Johnson and C. M. Henkle, et al. Mine now owned by Phelps, Dodge & Co. Property was first held by Copper King of Arizona, which abandoned same, 1902, and was relocated, 1903. Development is by a 625' shaft, in porphyry, with some lateral workings, which have cut a number of small stringers of copper ore, and dis-

seminated ore has been found in the fault and shear zones traversing the porphyry mass.

COPPER KING MINE.**BRITISH COLUMBIA**

Mine office: Kamloops, Yale district, B. C. Lands, 16 miles west of Kamloops, show ore giving assays of 5 to 20% copper, 1 to 6 oz. silver and \$10 to \$20 gold per ton. Was a small producer in 1902, but inactive since.

COPPER KING MINE.**MONTANA**

Property, 3 miles northeast of Basin, Jefferson Co., in Hiawatha gulch, is slightly developed. Principal workings consist of a 125' tunnel, and a 35' shaft, showing a quartz vein between granite walls, carrying tetrahedrite. Product runs high in silica, with about \$1.60 gold and 24 oz. silver per ton of selected ore, which is used for converter lining.

COPPER KING MINE.**MONTANA**

Mine office: Whitehall, Madison Co., Mont. Lands, 1 claim, 2 miles southeast of Parrot, showing ores assaying up to 12.5% copper, 0.85 oz. silver and \$2.80 gold per ton. Idle some years.

COPPER KING MINE.**PHILIPPINES**

Mine office: Benguet, Luzon, Philippines. Hanson & Meade, owners. Lands, on the Bued river, show refractory ores carrying fair copper and gold values. A small stamp mill was planned, at last accounts, to treat ores for their gold values. Idle.

COPPER KING MINE.**WASHINGTON**

See Chewelah Copper King Mining Co.

COPPER KING MINING CO.**CALIFORNIA**

Mine office: Hutton, Siskiyou Co., Cal. Lands, 4 claims, 2 fractional, known as the Blomfield group, near the Joe Creek Copper Co., and north of the Blue Ledge mine, showing a vein of 40' estimated width, paralleling the vein of the Blue Ledge Mining Co., and markedly similar. Development includes a 340' upper tunnel and 180' lower tunnel, showing copper ore carrying excellent gold values. Presumably idle.

COPPER KING MINING CO.**IDAHO**

Idle. Office and mine: Shoup, Lemhi Co., Idaho. Earl Gilbreath, mgr., at last accounts. Is a limited partnership, not an incorporation. Lands, 11 claims, area 220 acres, also 260 acres miscellaneous lands, on Beaver creek, in the Mackinaw district, showing numerous fissure veins in the quartzite, of which 3, with average width of 10 to 12', are opened by 2 shallow shafts and 7 tunnels, of which 3 are 300' each in length, with a total of about one-half mile of openings, showing cuprite and malachite giving average assays of 7% copper, up to 30% lead, 1 to 30 oz. silver, and \$1 to \$3 gold per ton, ore, as shipped, averaging about \$43 per ton in total values.

COPPER KING MINING CO.**MONTANA**

P. O. address: Cooke City, Park Co., Mont. Property is the King and Queen group, developed by tunnels, showing an extensive orebody, with fair values in gold.

COPPER KING MINING CO.**YUKON**

Mine office: Whitehorse, Yukon. Henry Baxter, mgr.; T. H. Kerruish, supt., at last accounts. Owns the Copper King claim, area 50 acres, crown-granted, in the Wheaton district, near Whitehorse. Orebody is a contact deposit. The 243' main crosscut tunnel cutting ore 150' from the portal, has a 63' winze in a vein of 5 to 8' width, in a garnetiferous limestone, near a granite contact, carrying chalcopyrite and bornite. Property shows high-grade ore, in small quantities, at numerous points. Equipment includes a 60-h. p. boiler, 20-h. p. hoist and a small air compressor. Production, to end of 1906, shipped to British Columbia smelters, was 400 tons of ore, averaging about 15% copper and \$1 to \$2 per ton in combined gold and silver.

Property considered promising, but requires further development to make a mine. Idle.

COPPER KING MINING & MILLING CO.

IDAHO

Office and mine: Ilo, Nez Perce Co., Idaho. Jesse L. King, supt., at last accounts. Lands, 6 claims, on the west side of Mission creek, about 7 miles from Jack Spur, and 7 miles from Culdesac. Mine, opened by tunnel, has a vein of 18' estimated average width, carrying ore of good copper tenor, with \$1 to \$2 gold per ton. Was developing, early 1909, with a small force. Idle.

COPPER KING MINING & SMELTING CO.

IDAHO

Office and mine: Mullan, Shoshone Co., Idaho. J. B. Elliott, pres.; E. B. Crawford, vice-pres.; Hon. Harry W. Ingalls, sec.-treas. and gen. mgr. Organized Aug. 28, 1901, under laws of Idaho, capitalization \$1,500,000, shares \$1 par; issued, 1,000,000 shares.

Property, 13 claims, 2 fractional, on the West fork of Deadman's creek in the Snowstorm copper belt. Claims have 2 narrow fissure veins, carrying galena and chalcopryite assaying 5% copper, 28% lead and 18 oz. silver per ton. Mine has 2 tunnels on the Copper King vein, on the Burke side of the mountain and No. 3, the lower tunnel, on the West fork of Deadman gulch, at depth of 927' below the Middle tunnel, No. 2 being 2,000' and No. 3 approximately 5,000' in length.

According to governmental reports, the vein is but 1' wide, runs northwest, dips at 40° S. and shows copper-lead sulphides in a quartz calcite gangue. The work is in Newland slates and St. Regis quartzite, not having yet reached the Revette quartzite. A 2' band of altered rock impregnated with galena and chalcopryite has been recently developed.

Equipment includes 12" and 24" Pelton wheels, taking water under a 500' head, with a 4-drill Franklin air compressor and a small electric light plant. Buildings include an engine house, boarding house, 27x42' bunk house and barn. About 15 men are employed. Property considered promising and management good.

COPPER KNOB MINE.

NORTH CAROLINA

Idle. Office and mine: Hopkins, Ashe Co., N. C. Richard Eames, Jr., owner. Lands, 160 acres, freehold, also 90 acres miscellaneous lands, showing a 30" fissure vein in hornblendic slate, carrying carbonate and sulphide ores, mainly bornite, estimated to average 6 to 8% copper, 15 oz. silver and \$12 gold per ton. Property was opened 1880. Has steam power, with hoist and 2-drill air compressor, and a 5-stamp mill. Management plans further development by an adit cutting Copper Knob mountain.

COPPER MINES CO. OF CALIFORNIA.

CALIFORNIA

J. B. Pearce, superintendent, Raymond, Madera Co., Cal. Property, the Green Mountain mine, showing a deposit of iron gossan underlain by copper sulphide ore. Development is by 650' tunnel. Equipment includes gasoline engine.

COPPER MINES OF NEWFOUNDLAND, LTD. NEWFOUNDLAND

Secretary's address: O. Wells, 49 Queen Victoria St., London, E. C., Eng. J. Ford and H. B. Smith, directors. Organized July 15, 1912, capitalization £5,000, shares £1 par, to deal in copper prospects in Newfoundland.

COPPER MOUNTAIN CLAIMS

CALIFORNIA

Address: W. E. Johns, Hornsilver, Nev. Mine address: Lida, Nev. Mine at Cocumongo Springs, Inyo Co., Cal. Owned by W. E. Johns, M. F. Nichols, Frank Baird, Ben Baird, Clyde Fletcher and Fred J. Ashman. Property, 9 claims, about one-half mile west of the Nevada state line and 4 miles from Cocumongo Springs, shows gossan outcrop 400' wide extend-

ing the length of 3 claims and covering a contact deposit between limestone and granite. The gossan is said to carry from a trace to 14% copper.

Development is by a 765' tunnel, cutting a 14' vein carrying bunches of 6% copper ore. This vein is 500' from the contact orebody. Goldfield, Nev., is the nearest rail point.

Property considered promising if a railroad is built to the Loretta mine, owned by Chas. M. Schwab, 18 miles distant.

COPPER MOUNTAIN CONS. MINING CO. CALIFORNIA

Idle. Mine near Redding, Shasta Co., Cal. John Pillius, pres.; F. G. King, vice-pres.; Fred Grotefend, sec.-treas. and supt., at last accounts. Lands, 17 claims, immediately northeast of the Mountain Copper Co., Ltd., on Sugar Loaf mountain, showing an ore zone, in rhyolite, with N. S. strike, carrying a gossan up to 400' in width. Mine has 12 tunnels, aggregating 4,365', which have cut several small detached pockets of sulphide ores. Equipment includes electric power and an air compressor.

COPPER MOUNTAIN COPPER CO. ALASKA

Mine office: Nome, Cape Nome district, Alaska. Property is near the head of the Nome river. A limited amount of development was done, 1907, and apparently none since.

COPPER MOUNTAIN MINING CO. IDAHO

Office: Mullan, Idaho. Mine office: Montpelier, Bear Lake Co., Idaho. Organized under laws of South Dakota, capitalization \$1,500,000, shares \$1 par. John Hendrickson, pres. and mgr.; A. B. Willard, vice-pres.; Thos. G. Kennedy, sec.-treas., at last accounts. Lands, 5 claims, unpatented, area 100 acres, known as the Blacksmith group, also a 5-acre mill site, near the Bonanza Mining Co., in Montpelier canyon, about 8 miles from Montpelier. Mine has a short tunnel, said to show copper ore carrying gold and silver values. Idle.

COPPER MOUNTAIN MINING CO. OREGON

Mine address: Grant's Pass, Josephine Co., Ore. C. E. Phillips, pres.; J. W. Gayetty, vice-pres.; W. R. Nipper, sec.-treas. Property is a gold mine, 40 miles from Grant's Pass, in the Takilma district.

COPPER MOUNTAIN MINING CO. UTAH

Office: 323 D. F. Walker Bldg., Salt Lake City, Utah. Mine near Milford, Beaver Co., Utah. Lands, 6 claims, owned formerly by Copper Mountain Mining & Milling Co., having open cuts and shallow shafts of 5 to 60', and a main shaft, of peculiar construction, about 250' in depth, showing an iron ore vein of 4 to 14' width, giving assays of 18 to 28% copper. Shaft is vertical for about 100', thence drops 100' at an angle of 75°, thereafter has 50' sunk at an angle of 70°, which is excellently bad engineering. Has gasoline power. Under lease to David Rees, Milford, Utah.

COPPER MOUNTAIN MG. & DEV. CO. BRITISH COLUMBIA

Office: 5406 Union Ave., South Tacoma, Wash. Mine office: Quatsino, Atlin district, B. C. B. S. Cowles, pres.; Jos. Hutchinson, sec.; B. D. Holcomb, gen. mgr.; A. T. Macaulay, supt., at last accounts. Capitalization \$200,000, shares 10 cts. par. The June group, at Quatsino sound, includes 5 claims, area 250 acres, showing an orebody said to be 100' wide, with measured length of 3,000', giving assays of 6 to 8% copper, 3 oz. silver and \$2 gold per ton, from chalcoppyrite. A large amount of ore is shown on the surface, and the deposit has been worked opencast. British Columbian group considered promising. Company also owns 4 claims near Ryan, Stevens Co., Wash., developed by 300' shaft and 115' tunnel, showing a 75' lens of low-grade ore.

COPPER MOUNTAIN MINING & DEVELOPMENT CO. MONTANA

Office: Mullan, Idaho. Mine near Thompson, Sanders Co., Mont. John

Hendricksen, pres.; A. B. Willard, vice-pres.; Thos. Kennedy, sec.-treas.; D. Flynn and John Foss, directors. Organized 1906, under laws of Idaho, capitalization \$1,500,000, shares \$1 par. Annual meeting, second Tuesday in December.

Lands, 5 claims, one fractional, area 95 acres, with 3 adjoining claims under option, at last accounts, at the head of Copper creek. Mine has 2 tunnels, the upper a crosscut, deflected for 56' along the vein, said to be 25' wide, carrying pockets and seams of copper carbonates, with gold and silver values. The lower tunnel, of 950', has a back of about 350'. Idle.

COPPER MOUNTAIN MINING & MILLING CO. COLORADO

Office: 438 Sheidley Bldg., Kansas City, Mo. Mine office: Ward, Boulder Co., Colo. Geo. W. Barnhardt, mgr., at last accounts. Property, about 1 mile north of Ward, developed by a 50' tunnel, showing a 6' vein of gold and silver ore. Idle.

COPPER PLATE MINING CO., LTD. IDAHO

Mine office: Mullan, Shoshone Co., Idaho. A. A. Hammer, pres.; J. W. Hutchins, sec.-treas., at last accounts. Company owns a number of unpatented claims upon which about 2,500' of development work has been done. Idle several years.

COPPER PRINCE CONS. MINING & MILLING CO. IDAHO

Office: Coeur d'Alene, Idaho. Mine office: Herrick, Shoshone Co., Idaho. Saml. B. Holbert, pres.; Saml. R. Hite, vice-pres.; Jas. V. Hawkins, sec. and mgr.; preceding officers, Wm. Hankins, S. C. Dooley, J. T. Wood and Boyd Hamilton, directors; Frank Drummond, supt. Organized July 30, 1910, under laws of Idaho, capitalization \$4,000,000, shares \$1 par, non-assessable; issued, \$2,775,000. Annual meeting, first Monday in September.

Lands, 37 claims, unpatented, area 740 acres, in 2 groups on the north bank of the St. Joe river, 6 miles and 20 miles, respectively, above the head of navigation. Property includes water rights. The Copper Prince group, formerly known as the Black Prince, has 13 claims, and the Idaho-Virginia, or Gold Ridge group, of about 24 claims, is about 6 miles east of the Copper Prince, and 3 miles from the Milwaukee railway.

The Copper Prince group shows contact orebodies, between granite and Revette quartzite, of 20 to 30' estimated average width, carrying chalcocopyrite, bornite and gray copper, giving assays of 3 to 41% copper, and 8 to 13 oz. silver per ton. Development is by drift tunnels, of 40', 40', 100' and 200', driven from the sides of 2 canyons. The orebody has been traced by trenches and crosscut tunnels, on each claim, for the entire length of property, a distance of 7,800'.

The Idaho-Virginia group is reported to have a 15 to 20' contact deposit, between granite and slate, carrying argentiferous galena giving assays of 8 to 40% lead, and 14 to 46 oz. silver. Development is by 2 shafts of 50' and 250' depth. Buildings include a smithy, boarding house and a stable.

Company plans utilizing water power from Prince Creek, by 6 miles of 3' ditch and 1 mile of 3' flume, also installing 4 boilers, 2 hoists, 2 six-drill air compressors, and a saw mill. Property is considered promising.

COPPER PRINCE MINING CO. CALIFORNIA

Mine office: Middletown, Lake Co., Cal. E. Lobree, pres.; J. C. Rud-dock, sec., at last accounts. Lands, 3 claims, 4 miles northwest of Middle-town, carrying a vein of 6 to 8' width, in limestone, with a strong gossan, developed by 2 trenches and a short tunnel, latter showing malachite and azurite, said to assay 5% copper, 1 oz. silver and \$3 gold per ton. Idle many years, and presumably moribund.

COPPER QUEEN CONSOLIDATED MINING CO. ARIZONA

Office: 99 John St., New York. Mine office: Bisbee, Cochise Co., Ariz.

Operating and works office: Douglas, Cochise Co., Ariz. Dr. Jas. Douglas, pres.; Arthur Curtiss James, vice-pres.; Geo. Notman, sec.-treas.; Stuart W. French, gen. mgr.; Gerald Sherman, gen. supt.; Joseph H. Hodgson, mine supt.; F. Rutherford, smelter supt., and C. C. Barclay, purch. agt. Organized Aug., 1885, under laws of New York, capitalization \$2,000,000, shares \$10 par. Is controlled through entire stock ownership by Phelps, Dodge & Co., Inc. The company was operated for many years as a close corporation, without making its figures public, but is said to have paid, 1888 to 1907, inclusive, dividends ranging from 10 to 115%, with an aggregate of \$30,000,000 or upwards. Dividends were \$3,000,000 in 1908; \$4,025,000 in 1909; \$6,300,000 in 1910; \$5,200,000 in 1911, and \$5,707,351 in 1912.

The company's holdings comprise the Copper Queen and other mines at Bisbee, a large smelting plant at Douglas, on the Mexican border, 30 miles from the mines and 21 claims, 19 patented, in the Central City mining district, Grant county, N. M., besides mining interests in various other localities. Mineral lands in the Warren, or Bisbee district, comprise 136 claims, 127 patented, 1,450 acres.

The Copper Queen, one of the best known copper mines of the world, was opened, 1880, on an outcrop of oxidized copper ore in massive limestone, opposite the Copper Queen hotel in Bisbee. The original orebody, now represented by a large cave, averaged 23% copper. The ore was smelted in a 30" water-jacket furnace, with English coke, brought via San Francisco. This orebody was exhausted in 3 or 4 years and the mine experienced many vicissitudes, until additional orebodies were developed, by following seams and stringers of ore leading to further large and rich deposits.

The ore-bearing formation of the Copper Queen and other mines of the Bisbee district, consists of thickly bedded limestone beds, dipping to the southward and cut by intrusive porphyritic dikes. Until 1902, the principal orebodies were found at the base of the carboniferous limestone beds, which are broken by igneous intrusive rocks, that evidently have a strong genetic bearing upon deposition. The ore deposits occur as pockets, lenses, chimneys, bunches, shoots, veins, stringers and seams, the larger bodies being connected, in most cases, by small veins, or mere knife-blade seams. The limestone and its included orebodies have a general gentle dip to the southeast, necessitating deeper shafts as distance is made toward the southeast. Extensive bodies of high-grade ore have been found, since 1902, in the deeper levels driven in the older limestones (Cambrian), and developments prove these underlying orebodies to be persistent to great depth. The mines show beautiful caves, lined with calcite crystals and stalactites and wonderfully fine crusts of azurite, malachite and cuprite; some of these caves are of considerable size. Many of the shafts are bottomed in sulphide ores of high grade, consequently the depth of the orebodies, while already proven great, is conjectural. New orebodies are developed yearly and the ultimate lateral limits of payable ore are unknown.

The mines are opened ahead for several years, the development averaging about 1 mile monthly of new workings, or at the rate of 1 linear foot of new work for 10 tons of ore extracted, which figure is proven by past experience to maintain practically constant ore reserves, while avoiding excessive advance openings that require useless maintenance cost. The stopes are filled throughout and the mines are timbered with square sets, mainly Washington fir, an average of 30' in timber, board measure, being required for each ton of ore won in the oxidized zone. Experiments were made, 1909, with concrete and steel for timbering, 6" steel I-beams weighing 8 lbs. per foot being tried for posts and caps, but these strong beams were soon

twisted and eventually broken. Notwithstanding numerous disadvantages of operation and menaces to life, the Copper Queen is one of the safest of mines, because of experienced and careful management.

The entire system of mine operation was changed, radically, in 1908, each of the principal shafts now being used for men, waste, timber and supplies, while practically all ore extraction is through the Sacramento shaft.

The underground haulage plant, installed 1908, is very extensive, with 17 miles of tracks, covering every second level from the 4th to the 16th, inclusive, ore from the intermediate levels being dropped through chutes, and all ore hauled to the Sacramento shaft for hoisting. The haulage system includes Goodman electric locomotives and side-dumping ore cars. Chutes have been installed throughout the mine for loading the cars, which discharge into large storage bins at the Sacramento shaft, through which all ore is hoisted. In order to complete the underground traction system, it was necessary to open many lateral drifts and crosscuts, which were located in solid ground, wherever possible, as the electric tram lines are the arteries of the mine.

The Czar shaft, which is the oldest, is 400' deep, with an electric hoist. The 600' four-compartment Holbrook shaft, located 1,100' southeast of the Czar, replaces the old Holbrook shaft, lost, 1906, by fire and caving. The shaft was retimbered, early 1911. The Holbrook, formerly the principal mine of the Copper Queen, having large and numerous bodies of exceptionally high-grade ore, is now second as a producer to the Lowell. The shaft has a steel headgear, and a 750-h. p. hoist, actuated by compressed air. This mine has tapped several gas pockets, but thus far, without serious results.

The Spray shaft, no longer used, is 1,400' southeast of the Holbrook, and near the Irish Mag shaft of the Calumet & Arizona, is 900' deep, with 3 compartments. This shaft shows rich ores from the 4th level to the bottom, the upper workings carrying mainly chalcocite, which changes to bornite on the 5th level, with oxidized ores and a continuance of sulphides on the 6th and 7th levels, ores being mainly sulphide on the 8th level. The orebodies are very extensive and persistent, and are found to be associated with frequent porphyry dikes. The Spray mine is now worked from the Holbrook and Gardner shafts.

The Gardner shaft, 1,450' southeast of the Silver Spray, with 3 compartments, 1,000' deep, has large bodies of high-grade ores, mainly sulphide, and is becoming an increasingly important producer. Surface equipment includes a 100' steel headgear, and a 750-h. p. 20x60" Nordberg hoist, actuated by compressed air.

The Lowell shaft, next southeast of the Gardner, is 1,600' deep. The Lowell shows no important orebodies above the 900' level, but has high-grade sulphides on the lower workings, the 1,000' level showing high-grade oxidized ores below sulphides. In the summer of 1913, a new orebody was discovered between the 1,000' and 1,200' levels. The Lowell has developed into a great mine, and is now the principal producer of the Copper Queen. This shaft makes about 175,000 gals. of water daily, which is forked to surface by a Prescott station pump on the 1,000' level. Equipment includes a steel headgear, and a 20x60" Nordberg hoist, actuated by compressed air, raising 3-deck cages.

The 638' Cuprite shaft, about 1,400' west of the Silver Spray, is connected underground with the Czar. No large orebodies have been located by this shaft, though it should find the extension of the orebodies of the Shattuck-Arizona.

The Uncle Sam mine has an old shaft, and a new shaft, sunk 1908, of 224' depth. This mine is connected with the Czar, Holbrook and Sacra-

mento shafts, and has a large orebody, discovered 1913, that compares favorably with the bonanza deposits of the adjoining Shattuck mine.

The White Tail Deer mine lies across the range on the edge of the mesa near Don Luis, being reached by wagon road through a detour of several miles. There is an old 100' incline shaft, sunk 1893, and some ore was shipped, 1904, by lessees, that carried 12 to 15% copper. A new shaft, begun June, 1910, had some drifts on the 150' level at the end of the year. The mine shows a deposit of low-grade ore, with prospects of developing ore of better grade. It has been unworked, save by lessees, for several years.

The 4-compartment Sacramento shaft, 1,700' deep, handles the entire output of the mine. There are loading bins on the even-numbered levels from 400 to 1,600', reached by the electric haulage lines from all other workings of the mine. The shaft was sunk in rock for practically its entire depth, insuring as great a degree of immunity from drawing as is possible in this district. The Sacramento is showing some rich ore, discovered 1913, on the 1,500' level near the Hoatson claim line. Exploratory work, 1912, in the porphyry stock of Sacramento hill, which is the geological keystone of the Bisbee ore deposits, has shown up a large tonnage of concentrating ore.

The hoist at the Sacramento is a powerful Nordberg tandem-compound engine, having 7' drums with 5' face, operated by steam, with 6 auxiliary engines, actuated by oil, under 150 lbs. pressure. Hoisting is done in 3-ton skips, and the hoist can raise a skip each minute, giving the shaft a capacity of fully 4,000 tons daily.

The Sacramento shaft has perhaps the most elaborate and ingenious system for mixing and loading ores to be found at any copper mine. The mine skips dump automatically upon a Stephens-Adamson belt conveyor, which carries the ore about 150' down the hill to the loading tracks. The loading shed is of steel, with 4 railroad tracks running beneath, cars being loaded from 2 conveying belts running lengthwise between the 4 tracks, ore being scraped off the belts by dumping carriages moving continually back and forth, the motion mixing the ore thoroughly. Every skipload is weighed automatically, and 10% is loaded into a special car, for sampling and checking.

Two monstrous slag dumps near the Czar shaft, remaining from the old smelting plant, originally contained about 1,000,000 tons, of about 2% average copper tenor. These are being broken up and shipped to the Douglas works, from time to time, for resmelting, as opportunity offers.

The central power plant is near the Sacramento shaft. The buildings, of steel frame, are a boiler house, having four 400-h. p. Stirling water-tube boilers, furnishing steam direct to the hoists at the nearby Sacramento and Gardner shafts, the hoists at the other shafts being operated by compressed air. Equipment of the engine house includes three 500-kw. Curtis turbo-generators, 3 Ingersoll-Rand air compressors, of about 100 drills aggregate capacity, a 70-drill Nordberg air compressor, the largest in the Southwest, and a 7,000 cu. ft. Nordberg compressor, installed in 1913, in 20 days' work, a record-breaking time. Fuel is Texas and California petroleum, with large tanks for oil storage. All of the shafts, and the principal mine buildings, are reached by spurs of the El Paso & Southwestern railway.

In addition to the Copper Queen mine at Bisbee, the company has interests in several other districts.

The Great Western mine at Courtland, in the northern part of Cochise county, is about 30 miles north of Bisbee, has 2 shafts; deepest 650', and is owned jointly with the Great Western Copper Co. It is understood that considerable ore has been developed, which is being mined and shipped at

the rate of 100 tons daily. Mine has a steam plant generating electric current for its own use and sold to the neighboring mines.

The company owns mineral lands in the Old Hat district, in the Catalina mountains, north of Tucson, Pima county, Ariz.; also holds the Hanover mine at Fierro, Grant county, N. M.

The Douglas smelter, known as the Douglas Reduction Works, is at Douglas, Ariz., 28 miles from the mine and one-half mile from the Mexican border. This plant treats 3,000 tons daily, handling the output of the Copper Queen mines and that of the Moctezuma Copper Co., as well as doing a general custom-smelting business. The works occupy a site of 320 acres and are served by a very complete standard-gauge railroad system, reaching every building. The plant was blown in March, 1904, since which time there has been almost continuous enlargement, the works costing fully \$4,000,000, smelting about 3,000 tons daily, there being no concentrator to eliminate part of the tonnage from the final furnace charges.

Water for the works is secured from artesian wells, of about 300' average depth, the water rising nearly to the surface, with 1 well, of about 1,000' depth, flowing 200 gals. per minute. A large reservoir and cooling tower have been built in connection with the water supply.

The ore-bedding system consists of 5 pits, each 40x800' in size, and 11' deep, having an aggregate storage capacity of 90,000 tons. Ore, received from the mine in side-dumping steel cars, is discharged into the pits, which are lined with white tufa rock. The pits are filled with the different grades of ore required to constitute a normal furnace mixture, and the ores mixed by a mechanical plow. Ore is removed, as required by the furnaces, with steam shovels, running on permanent tracks laid upon the floors of the pits.

The blast furnace building, 150x900' in size, of steel frame, also covers the converter department. Three 60-ton traveling cranes, of 60' span, run the entire length of the building. There are ten 400-ton blast furnaces, each 44x240" with forty 4" tuyeres, and 16' in height from the tuyeres to the charging floor. The 10 furnaces are set 15' apart, in a single row, with a 10x20' settler between each pair, the lower half lined with chrome brick and the upper half with ordinary fire brick. Ore is charged on either side, alternately, charging being done from trains of twenty 2,500-lb. cars, hauled by 13-ton electric locomotives. Slags flow from the settlers into 18-ton slag cars, hauled by electric locomotives. The slag dump is 1,700' long, and is kept trim by a special leveling machine, operated by electric power. The blast furnaces consume 350 to 400 tons of coke daily.

The dust chamber is of steel frame with brick and tile walls, roofed with reinforced concrete supported by steel trusses and has a bottom of tiled hoppers.

Molten matte is taken from the blast furnace to the converters by 60-ton electric traveling cranes, each having two 15-ton auxiliary hoists. The converter department has 8 stands, operated hydraulically, with 36 shells, of the well-known Copper Queen barrel type, 96x126" in size. Copper is poured in a Walker casting machine, and product is blistered copper of about 99% tenor, with considerable gold and silver values. The converter plant has a new flue, taking the gases from the 8 stands to a dust flue 11' in diameter at the hoods and 13' at the dust chamber. The lining department has 3 grinding pans, with pneumatic tamping machinery.

The 260' steel stack of the blast furnace building is 30' in diameter at the base and 25' at the top.

The calcining and reverberatory plant is 100x850' in size, of steel frame. Ore is brought in over an elevated railway track on steel trestles, 400' in

length, and dumped into concrete storage bins, and drawn, from the bins to the roasters by belt conveyors. There are four 100' reverberatory furnaces and twelve 75-ton McDougal calciners, planned to be increased to 16 eventually. A slag tunnel, 30' wide, 15' deep and 276' long, has electric cars, connecting with the slag tracks. The tunnel is lined with 4' concrete walls, with a 2' separating wall in the center. The reverberatory furnaces are next to the old building, succeeded by the slag tunnel, on top of which there is a battery of four 400-h. p. water-tube boilers, followed by a dust chamber; the McDougal roasters occupy the northern end of the building. The reverberatory department has a separate 300' stack, of 22' inside diameter, built of special hollow bricks, with walls 42" thick at the bottom and 12" at the top, requiring 1,250,000 brick and standing on a base of 60' diameter requiring 1,100 cu. yds. of concrete.

The power house, of steel and brick, was enlarged to transmit electric energy 72 miles to El Tigre mine, in northern Mexico. The power plant has about 20 units, of various sizes and types, aggregating more than 6,000 h. p. Equipment includes 4 Nordberg cross-compound blowing engines, each direct-connected to a 400-kw. 250-volt direct-current generator; Nos. 9 and 10 Connersville blowers, set staggering; a cross-compound 2-stage condensing air compressor, with piston capacity of 2,000 cu. ft. of free air per minute, at 100 lbs. pressure, for running the pneumatic tamping devices, operating charging doors of the blast furnaces and pumping water; 3 triplex motor-driven pumps, delivering water into compression tanks, at 350 lbs. pressure per square inch, with automatic regulation; four 400-kw. 250-volt direct-current generators, supplying power for cranes, slag locomotives and electric lights; two 750-kw. turbo-generators and a number of minor engines and dynamos. The power plant is equipped with a complete set of gauges and meters, keeping exact record of the distribution of power to every department and subdepartment.

The steel boiler house has six 500-h. p. and four 1,000-h. p. Stirling water-tube boilers, with a Green fuel economizer, and a Foster superheater with capacity of 90,000 lbs. of steam per hour. The stack of the boiler house is of brick, 177' high and 13' in diameter at the base. Boilers are arranged to burn either coal or petroleum, but latter is used exclusively, consumption of California and Texas petroleum, at the mine and works, amounting to about 500,000 gals. monthly. Oil for fuel is at present cheaper in first cost, easier and cleaner to handle, and effects a great saving in the wages of 3 daily shifts of stokers, formerly required at every boiler plant.

The plant has splendidly equipped saw mill, planing mill, machine and boiler shops, smithy and foundry, capable of manufacturing anything in the way of machinery.

A limestone quarry, at Lee station, 7 miles east of Douglas, has a large crusher and storage bins, the smelter requiring 400 to 500 tons of limestone daily, for flux. A saw mill is operated, in the forests of the Chiricahua mountains, though the bulk of the timber and lumber requirements of the mine and works are met by the importation of timber from the Pacific coast.

An employees benefit association was inaugurated, 1909, and has exclusively voluntary membership, open to any employee, regardless of grade. The finances are administered by a joint board, composed of officers and employees, the company subscribing \$7,500 annually if half of the employees join. Beneficiaries are given half wages if sick or injured, with 1 year's wages to heirs if the employee dies through sickness, and 2 years' wages if death is met accidentally, with other payments for loss of limbs, total disability, etc.

Production for recent years has been as follows:

Year.	Tons Mined.	Lbs. Copper.	Oz. Silver.	Oz. Gold.	Lbs. Lead.
1906.....		79,536,416	332,723	7,573	.....
1907.....		66,916,972	338,723	4,197	.....
1908.....		82,583,145	530,492	8,352	182,677
1909.....		84,802,147	601,828	8,674	437,601
1910.....	596,193	76,428,908	608,096	12,430	696,118
1911.....	619,132	74,489,728	1,227,453	16,895	5,658,930
1912.....	786,368	88,280,908	1,027,130	18,023	2,953,685

Smelter production, including custom ores, was 123,876,100 lbs. copper, 1,689,152 oz. silver and 27,687 oz. gold, in 1912.

Cost of finished copper delivered, 1912, was about 8 cts. per lb. after deduction of included gold and silver values and including the reduction in cost of copper bought through the profits from the very considerable custom business at the smelter.

The mine is one of the best in existence and within the past decade has been given thoroughly adequate mining and reduction plants. The management is exceptionally capable and far-sighted and deserves high commendation for the friendly and helpful spirit shown in dealings with employees, neighbors and general public.

COPPER QUEEN CONSOLIDATED MINING CO. NEW MEXICO

Office and mine: Fierro, Grant Co., N. M.; S. L. Landon, supt. Property, in the Fierro district, about 10 miles west of Hanover, shows Paleozoic sediments cut by quartz monzonite porphyry. Ores are mainly iron with some copper. Development is by the 300' Emma shaft.

COPPER QUEEN & COPPER KING GROUP. NEW MEXICO

Mine near Steins, Grant Co., N. M. Dr. Hamilton, of El Paso, Texas, owner. Property reported to show a monzonite porphyry dike, 100' wide impregnated with copper sulphides and averaging about 3% copper. Development by shaft. Mine east of the San Simon valley and 5 miles from the S. P. R. R.

COPPER QUEEN GOLD MINING CO. ARIZONA

Office: Mayer, Yavapai Co., Ariz. Louis Goldman, pres. and mgr. Lands, 12 claims, patented, and a mill site on the Agua Fria river, 6 miles east of Humboldt. Additional lands, held in trust, comprise 11 claims known as the Martin group. These are under a 3-year option to purchase.

The property shows great dikes of black, silicified schist, cut in places by rhyolite dikes. Development is by 3 tunnels of 280', 628' and 540', with about 2,000' of workings showing a 17' vein carrying chalcopryrite, chalcocite and tetrahedrite ore with some gold and silver.

Equipment consists of a 3-drill air compressor and 32-h. p. gasoline engine located at No. 2 tunnel. Was developing with small force at last accounts.

COPPER QUEEN GROUP. NEVADA

Office: Lovelocks, Nev. E. L. Connell and J. T. Perry, owners. Property, 10 claims, unpatented, in the Dixie district, Churchill county, 65 miles by road south of Lovelocks, is said to show an outcrop ranging from 100 to 150' wide and traceable across the entire group. The outcrop occurs over a porphyry dike with granite walls. Samples show bornite and chalcopryrite besides oxidized ores, carrying 2 to 10% copper with small gold and silver values. Property only slightly prospected and idle except for annual assessment work. Claims are 1,400' above Dixie valley, or at 6,000' elevation.

COPPER QUEEN MINE. ARIZONA

Office: Stoddard, Yavapai Co., Ariz. Mine is opened by a 350' tunnel showing auriferous copper ore. Was developing with small force at last accounts.

COPPER QUEEN MINE.**CALIFORNIA**

In Mariposa Co., Cal. Leased, Nov., 1912, by Feltz, Bradtord & Ives and developed by 125' shaft. Ore shipped to the Kennett smelter is reported to have carried 15% copper.

COPPER QUEEN MINE.**CALIFORNIA**

Office: Portola, Plumas Co., Cal.; Jack Daly, lessee. Mine is opened by tunnel, showing a vein of auriferous copper ore said to give assay values of 23.9 to 27% copper.

COPPER QUEEN MINE.**CALIFORNIA**

There are copper mines of this name at Bridgeville, Humboldt Co., Deep Springs, Inyo Co., Nipton, San Bernadino Co., and at Pitt river, Shasta Co., noted in former volumes of this book, but of which recent returns are lacking.

COPPER QUEEN MINE.**IDAHO**

T. E. Lynch, owner, Digby, Nova Scotia, Canada. Mine near Sunfield, Lemhi Co., Idaho. Property, 3 claims, patented, 59 acres, known as Copper Queen, Gold Finch, and Blue Bird, 8 miles from Tenday station, on the Gilmore & Pittsburgh railroad, in the McDevitt district. Developed by a 250' shaft and 3 tunnels of 375', 200' and 75' length. This mine has yielded very rich ore, in which the bornite shows free gold. The ore occurs in irregular shoots and bunches in a vein of white quartz in quartzite and silicious slate. The vein conforms to the rocks in strike and dip (40 to 70°) for 150' below the surface, but changes below.

The mine is erroneously reported to be the property of the Copper Queen Gold Mining Co., in a Geological Survey report (Bull. 528, p. 120) but has belonged to T. E. Lynch since 1907. The Copper Queen Mining & Smelting Co. leased the Queen of the Hills mine, 40 miles away. The Copper Queen mine was leased, 1911, to A. B. Bennett of Toston, Mont., who sorted and shipped 448 tons of ore to Salt Lake City that averaged 29.4% copper, 5.2 oz. silver and 0.81 oz. gold per ton.

COPPER QUEEN MINE.**MEXICO**

Owned by Velardena Mining & Smelting Co., at Velardena, Cuencame, Durango, Mex.

COPPER QUEEN MINING CO.**WASHINGTON**

Mine office: Chewelah, Stevens Co., Wash. Lands, 6 claims are reported under bond and lease to the United Copper Mining Co.

COPPER QUEEN MINING & MILLING CO., LTD.**IDAHO**

Former office: Mullan, Shoshone Co., Idaho. See Vol X.

Company was amalgamated with the Reindeer Copper & Gold Mining & Milling Co., Ltd., and reorganized under title of Reindeer Queen Mining Co., 1913. Property described under latter title.

COPPER QUEEN MINING & SMELTING CO.**IDAHO**

Office: 608 Lonsdale Bldg., Duluth, Minn. Mine office: Salmon, Lemhi Co., Idaho. Geo. H. Crosby, pres. and gen. mgr.; Emerson Hill, vice-pres. and supt.; A. J. McLennan, sec.-treas. Organized June 12, 1905, under laws of Arizona, capitalization \$500,000, shares \$1 par, nonassessable; issued, \$282,000. Absorbed 1908, the Copper Queen & Crescent Mining & Smelting Co., giving 1 share for 8.

Property, the Queen of the Hills mine, with 17 claims, 320 acres, in the Eureka district, 7 miles northwest of Salmon, having 3 nearly vertical fissure veins in granite and schistose quartzite, with a generally northeast strike. The Eva, or westernmost vein, shows an 8 to 14" quartz band on the wall of a brecciated zone 5' wide. The central, or Queen, and the Nellie veins show 12 lodges of granite breccia partly cemented by quartz. The ore is coarsely crystalline quartz, carrying pyrite, chalcopyrite and

some galena, with \$3 to \$5 in gold. This ore occurs in 5 known oreshoots, 2 in the Nellie, 2 in the Queen and 1 in the Eva vein.

Development is by shafts of 105' and 400' with 5 levels and by 7 tunnels, longest 450' with 4,700' of workings.

Equipment includes a 100-h. p. electric plant, a 24-h. p. hoist, good for 700' and a 5-drill air compressor. There are 10 buildings, including a 50-ton log mill, having 15 Allis-Chalmers stamps, a gyratory crusher and 2 Wilfley tables. Property considered promising.

COPPER RANCH GOLD MINING & MILLING CO. COLORADO

Office: 1711 Tremont St., Denver, Colo. Mine office: Ward, Boulder Co., Colo. W. E. Alexander, pres.; Thos. Fielding, sec., at last accounts. Organized under laws of Colorado, capitalization \$1,000,000, shares \$1 par. Lands, 170 acres, patented, in the Grand Island district of Boulder county, Colorado, opened by a 218' shaft, with 350' of drifts. Property is under bond and lease, for \$30,000, to J. G. Clarke, of Boulder, Colo.

COPPER RANCH MINING CO. UTAH

Office: 323 D. F. Walker Bldg., Salt Lake City, Utah. Mine near Milford, Beaver Co. Utah. Moses Thatcher pres.; C. L. Rood vice-pres. Organized under laws of Utah, capitalization \$500,000, shares 50 cts. par.

Lands, 17 claims, 340 acres, in process of patenting, including the Jewel mine, between the Old Hickory and O. K. mines of the Majestic Mines Co., carrying 2 miles of the strike of a vein of about 100' claimed width, opened at intervals for a mile, showing ores, assaying up to 43% copper, 10 oz. silver and \$8 gold per ton. Management estimates that entire vein will average 4 to 7% copper, with fair gold and silver values, which is a serious overestimate. Ore carries 5 to 25% iron, rendering it desirable for fluxing purposes. The mine has but slight development, with a shaft poorly planned, 32' deep on the incline and 43' farther vertically, mainly in ore. In 1910 shipped 8 tons of ore, returning 13.5% copper and 16.5 oz. silver per ton. Idle some years, except for annual assessment work.

COPPER RANGE & ARIZONA MINING CO. ARIZONA

Idle. Francis Flint, pres.; Hon. Wm. E. Ludden, vice-pres.; Frank S. Wright, sec.; Geo. S. Saville, treas., at last accounts. Organized Nov., 1904, under laws of Arizona, capitalization \$1,000,000, shares \$2 par. Lands, 15 claims, 5 patented, area 300 acres, with 3 mill sites and water rights, in the Santa Catalina mountains, about 25 miles northeast of Tucson, the nearest rail point. Mines, known as the Homestake and Silver Reef, carry 5 contact deposits, between limestone and quartzite, with 2, under development, estimated at 8' average width, traceable 1,500', carrying chalcopryrite, galena and sphalerite, estimated by management to average 6% copper, 20% lead, 17% zinc and 5 oz. silver per ton. Mine is developed mainly by tunnel, with 1,700' of workings, and is said to have considerable ore blocked out.

COPPER RANGE CO. MICHIGAN

Office: 82 Devonshire St., Boston, Mass. Mine office: Painesdale, Houghton Co., Mich. Wm. A. Paine, pres.; Chas. A. Snow, vice-pres.; Frederic Stanwood, sec.-treas.; Frederick W. Denton, gen. mgr.

Organized 1899, under laws of Michigan, capitalization \$2,500,000, shares \$25 par. Is controlled, through ownership of 99,699 shares, by Copper Range Consolidated Co. Owns 50,000 shares of Champion Copper Co., which is one-half the total issue, and 26,051 shares of the Copper Range Railroad Co. Income, practically all from dividends on stocks held, was \$502,913.97 in 1907; \$254,338.65 in 1908; \$665,646.98 in 1909; \$533,173 in 1910; \$331,199 in 1911 and \$582,404 in 1912, company beginning 1913 with a

cash balance of \$127,188. Dividend rate is \$1.50. Dividends have been as follows: \$3 in 1905; \$6 in 1906; \$4.50 in 1907; \$3 in 1908; \$6 in 1909; \$4.50 in 1910; \$3 in 1911, and \$4.50 in 1912.

Lands, 9,360 acres, in a compact tract south of the Baltic mine, in T. 54 N., R. 34 W., and T. 54 N., R. 35 W., upwards of 5,000 acres being on the mineral belt. Miscellaneous lands include 441 acres, with nearly 4 miles frontage on Lake Superior, near the mouth of the Graveraet river, 3 miles southwest of the Champion mill, at Freda, sufficient to give sites to 3 new stamp mills. The mineral tract was explored, 1907, by 1,535' of diamond drilling, without results.

Considerable diamond drilling was done, 1908-1909, giving a complete cross-section of a tract comprised of Sec. 7 and 8, which were under bond from St. Mary's Mineral Land Co., but the lands were surrendered, Sept. 22, 1909, after boring 7,600' of drill holes, at cost of \$27,500.

COPPER RANGE CONSOLIDATED CO.

MICHIGAN

Office: 82 Devonshire St., Boston, Mass. Mine office: Painesdale, Houghton Co., Mich. Wm. A. Paine, pres.; Frederick W. Denton, and R. T. McKeever, vice-presidents; Frederick Stanwood, sec.-treas.; preceding officers, Chas. J. Paine, Jr., Frank McM. Stanton, Samuel L. Smith, F. Ward Paine and John R. Turner, directors; John M. Wagner, purch. agt.; C. E. Cleaves, mech. engr.

Organized Nov., 1901, under laws of New Jersey, capitalization increased, 1903, to \$38,500,000, and again increased, 1907, to \$40,000,000, shares \$100 par; issued, \$39,369,200. American Trust Co., Boston, transfer agent; Old Colony Trust Co., Boston, registrar. Annual meeting, first Wednesday in May, in Jersey City, N. J.

Balance sheet of Dec. 31, 1912, included \$455,498.97 cash assets, with liabilities of \$1,100,000 notes payable, and deposits by the United Metals Selling Co., Atlantic Mining Co., Trimountain Mining Co., Copper Range Co. and Copper Range Railroad Co., aggregating \$743,408.04. Stock assets were 99,659 shares Baltic Mining Co., 99,699 shares Copper Range Co.; 99,345 shares Trimountain Mining Co.; 93,470 shares Atlantic Mining Co.; 16,392 shares Copper Range Railroad Co., and \$870,000 of Copper Range Railroad Co. bonds. Assets included notes receivable, of the Baltic Mining Co., \$174,637.80, and the company held in its treasury 791 shares unissued, to exchange for outstanding shares of Baltic Mining Co. and Copper Range Co. The Copper Range Consolidated Co. controls, through practically entire ownership, the Copper Range Co., Baltic Mining Co., Trimountain Mining Co., and Atlantic Mining Co., and owns a half interest in the Champion Copper Co.

Receipts were \$4,384,315 and disbursements \$4,128,502.82 in 1907; \$2,641,936.97 and \$2,574,021.74 in 1908; \$2,386,456.39 and \$2,347,330.65 in 1909; \$2,099,261.15 and \$2,193,717.28 in 1910; 1,395,601.30 and \$1,542,973.23 in 1911, and \$1,979,719.42 and \$1,839,772.37 in 1912.

Dividends have been as follows: \$1,536,086 in 1905; \$2,300,064 in 1906; \$2,304,810 in 1907; \$1,536,740 in 1908; \$1,536,930 in 1909; \$1,537,340 in 1910; \$1,357,104 in 1911 and \$788,428.50 in 1912, total dividends to end of 1912 having been \$12,902,248.50. The dividend payable Oct. 1, 1913, was reduced from 75 cts. to 50 cts., making total dividends in 1913, \$2.75.

The Globe mine, south of the Champion, was extensively developed, for several years, to a depth of 900' at a cost of about \$600,000, but was abandoned, 1909. This property is separately described.

While the Baltic, Trimountain and Champion mines are fully described under the titles of their respective owners, the consolidated figures of the 3 mines are as follows: Rock stamped, 1,914,331 tons in 1907; 1,893,749 tons

in 1908; 1,891,576 tons in 1909; 1,820,769 tons in 1910; 1,779,072 tons in 1911 and 1,784,402 tons in 1912, with average returns per ton, in fine copper, of 21.62 lbs. in 1907, 21.94 lbs. in 1908, 21.73 lbs. in 1909, 23.32 lbs. in 1910, 20.87 lbs. in 1911 and 21.07 lbs. in 1912. Production of the 3 mines was 41,385,015 lbs. fine copper in 1907; 41,546,525 lbs. in 1908; 41,105,311 lbs. in 1909; 42,468,754 lbs., in 1910; 37,130,292 lbs. in 1911 and 37,584,647 lbs. in 1912.

Average cost of copper produced by the subsidiary companies of the Copper Range is about 10.5 cts., and the Champion is one of the cheapest cost producers of the entire Lake Superior district, and among the cheapest in the world. Recent production, through subsidiaries, has been as follows: 32,714,859 lbs. fine copper in 1905; 32,382,983 lbs. in 1906; 33,140,297 lbs. in 1907; 32,653,143 lbs. in 1908; 32,102,780 lbs. in 1909; 32,856,692 lbs. in 1910; 29,310,579 lbs. in 1911; 28,967,428 lbs. in 1912.

As the company's principal mine, the Baltic, has had lessening output and higher costs for several years past, the company's income has suffered, but the Trimountain mine is increasing its earnings and will probably in the future offset any further decline of the Baltic. The Champion is holding its own.

The fact that Copper Range paid dividends in excess of earnings of subsidiaries in 1908-1911, necessitated a curtailment in 1912, but the working capital is now restored and but for labor troubles, the company would be able to maintain its \$3 dividend rate. The future should show an improvement in operating profits of the company. Management is progressive, able and highly efficient.

COPPER RANGE RAILROAD CO.

MICHIGAN

Office: 82 Devonshire St., Boston Mass. Operating office: Houghton, Mich. Wm. A. Paine, pres.; R. Townsend McKeever, vice-pres.; Frederick Stanwood, sec.-treas.; preceding officers, John H. Rice, Frederick W. Denton, Frank McM. Stanton, Thos. S. Dee, Wm. D. Calverley and Samuel L. Smith, directors; F. R. Bolles, gen. mgr. and A. H. Ehlers, supt.

Organized 1899, under laws of Michigan, capitalization \$5,000,000, shares \$100 par; issued, \$4,244,300. Debentures outstanding, \$2,280,000 first-mortgage 5% bonds. Company is authorized to issue bonds to extent of \$20,000 per mile of completed main line, and \$15,000 per mile of completed branch lines and sidetracks. Is controlled, through ownership of entire stock issue, by Copper Range Co. and Copper Range Consolidated Co. Balance sheet of Dec. 31, 1912, gave cost of road at \$5,983,948, with equipment inventoried at \$816,220. Gross earnings were \$659,252.86 in 1905; \$860,434.84 gross and \$111,298.51 net in 1907; \$768,808.98 gross and \$16,379.09 net in 1908; \$754,393.75 gross and \$170,261.80 net in 1909; \$721,127.88 gross and \$75,167.65 net in 1910; \$717,069.92 gross and \$53,531.70 net in 1911, and \$754,921.06 gross and \$103,775.44 net in 1912. The first dividend, of 10%, was paid 1909. About 75% of the gross income is derived from transportation of ore, mineral and freight.

The railroad has upwards of 100 miles of trackage, the 65-mile main line running from Calumet to McKeever, and connecting with the Keweenaw Central at Calumet; the Duluth, South Shore & Atlantic, Hancock & Calumet and Mineral Range railways at Hancock and Houghton, and the Chicago, Milwaukee & St. Paul railway at McKeever. The company also has trackage rights over 19 miles of the Chicago, Milwaukee & St. Paul railway, between McKeever and Ontonagon, and operates a daily passenger service between Calumet and Ontonagon, with additional trackage rights of 73 miles over the same line, over which fast freights are operated between Calumet and Channing, Mich. Trackage rights have been given the Chicago, Milwaukee & St. Paul over the Copper Range be-

tween McKeever and Houghton, and a direct passenger service, with exceptionally good equipment, is operated jointly by the Chicago, Milwaukee & St. Paul and Copper Range lines, between Chicago and Houghton. Wooden bridges and trestles are being replaced with steel. Spurs connect the main lines with all of the principal mines along the right-of-way. Train dispatching is by telephone.

The company owns a half interest in a bridge crossing Portage lake, between Houghton and Hancock. An extensive water frontage on Portage lake, in the western part of Houghton, is improved by a 2-story stone and brick general office building, shops, roundhouse, warehouses and wharves for merchandise and coal. The coal wharf is equipped with modern unloading machinery, and has deep water alongside, capable of accommodating the largest freighters plying the great lakes. The Copper Range railway is a model small road.

COPPER REEF CONSOLIDATED MINES.

ARIZONA

Office: 1409 Park Bldg., Pittsburgh, Pa. Mine office: Stanley, Graham Co., Ariz. M. J. Kennedy, pres.; H. S. Paul, vice-pres.; W. A. Griffith, sec.; E. H. Myers, Jr., treas.; Ralph A. Meyer, gen. mgr. and mg. engr.; Chas. F. Martin, financial agent; preceding officers E. M. Gross, W. H. Williams, W. F. Wegley and Wm. H. Parks, directors; D. S. McDonald, supt. Organized Feb. 19, 1910, under laws of Arizona, capitalization \$5,000,000 shares \$5 par; issued 632,000 shares. Union Trust Co., Pittsburgh, transfer agent. Annual meeting, first Monday in February.

Property, 125 claims, 2,500 acres, including 600-acre mill site, in the Stanley Butte district, 15 miles southwest of San Carlos, and west of Stanley P. O. Claims are on the western slope of a high mountain ridge whose eastern face shows granite overlaid by 600' of quartzite capped by limestone, while the western slope is plated with massively bedded gray limestone. On the claims these rocks are carboniferous and cut by numerous fractures carrying small replacement bodies of silicious copper ore. The rocks dip down the slope at 35° and most of the orebodies are either in gash veins or occur along fractures conformable to the bedding. In the many older pits and shallow shafts, the narrow gash veins were not over 2' wide and the ore pinched out at 20 to 30' in depth.

Development said to aggregate 3,600', is mainly by tunnel, but includes the 575' North Star and 125' Jessie shafts. The California No. 1 tunnel, 1,360' long with 776' drift, 20' and 226' raises, 50' and 100' winzes, constitutes the chief underground workings. The 83' Queen tunnel also shows ore. The manager estimates 80,000 tons developed by this work, which is too liberal an estimate. Ores average about 5.4% copper and 68% silica, the copper being partly in the form of chalcopyrite and bornite, mixed with chrysocolla, malachite and azurite, etc. Management reports average value of 8.65% copper with varying gold and silver values up to \$12 per ton.

Equipment includes two 40-h. p. gasoline hoists, an Ingersoll-Rand 4-drill air compressor and all necessary mine buildings. Company plans installing much new machinery during the next year, including a 100-ton electric furnace, two 1,000-kw. electric generators and steam turbines.

COPPER RESERVE MINING & REDUCTION CO.

UTAH

A. H. Tarbet, pres.; Henry T. McEwen, sec., at last accounts. No trace of operations securable. Not favorably regarded.

COPPER RIDGE MINING & MILLING CO.

COLORADO

Idle. Mine office: Steamboat Springs, Routt Co., Colo. W. H. Dunfield, pres.; Clinton E. Bivens, vice-pres.; W. C. Shaw, sec.-treas.; Burt Goldsworthy, gen. mgr., at last accounts. Organized 1907, under laws of Colorado, capitalization \$300,000, shares \$1 par. Lands, 2 claims, known as

the Democrat and Republican, 5 miles north of Steamboat Springs, carrying a fissure vein opened by a shaft of 100', showing ore assaying up to 18% copper, 2.5 oz. silver and \$10 gold per ton.

COPPER ROCK GOLD M. & M. CO. COLORADO & WYOMING

Idle many years. Mine office: Sunset, Boulder Co., Colo. Mine near Encampment, Carbon Co., Wyo. H. Lee Servoss, pres.; Dan G. Kirshbaum, sec. and mgr.; John Wessels, supt., at last accounts. Capitalization \$1,500,000, shares \$1 par.

The Colorado property, known as the Lee S., area 60 acres, in the Sugar Loaf district, near Sunset, has a 300' shaft, claimed to show a large vein having occasional paystreaks up to 20" in width, carrying high-grade auriferous copper ore. Some work was done on this property, 1908. The Wyoming property, 6 claims, area 120 acres, known as the Copper Link, has shafts of 50', 100' and 285', showing some leached copper ore carrying up to \$4 gold per ton. Probably out of business.

COPPER RUN COPPER CO. NEW JERSEY

Idle and presumably moribund. Is said to own lands in Hunterdon county. No trace of operations securable.

COPPER SHIELD MINING CO. NEVADA

Office: 45 W. Second St., Salt Lake City, Utah. Mine office: Contact, Elko Co., Nev. Dr. C. I. Douglas, pres.; U. U. Hiskey, vice-pres.; C. R. Strock, sec.-treas.; H. M. Shields, mgr., and J. A. De Valley, directors. Organized, 1907, under laws of Nevada, capitalization \$1,000,000, shares \$1 par; issued 608,000. Annual meeting, second Tuesday in April. Lands, 11 claims, 200 acres, in the Salmon River district. Development is by 4 shallow shafts, deepest 73', and several tunnels, with a total of 646' of workings, showing 4 veins in monzonite porphyry dikes in grano-diorite, said to carry up to 56% copper and 2 to 6 oz. silver per ton. Oregon Short Line railroad is 37 miles distant.

COPPER-SILVER MONTANA MINING CO. MONTANA

Office of mine: Diamond Block, Helena, Lewis and Clark Co., Mont. Edw. Brennan, pres.; Sanford McKusie, vice-pres.; A. P. Heywood, sec.; Walter P. Stellmach, treas.; E. R. Purnell, gen. mgr.; preceding officers, C. W. Dresser, M. A. Kearney and Frank Bortos, directors. Organized May 31, 1906, under laws of Montana, capitalization \$400,000, shares \$1 par, non-assessable; issued, \$300,000.

Lands, 7 claims, area 130 acres, adjoining the Lexington and Sacajewea, in the Scratch Gravel district, 1 mile from Great Northern railway and 5 miles north of Helena. Property shows granite and monzonite, reported to carry numerous fissure veins, several dipping northwest and others dipping southeast. All veins are reported mineralized at surface, carrying melaconite, azurite and malachite. Mine has a 500' shaft, cutting at 300', a vein estimated to average 4.5% copper, 12 to 100 oz. silver, and \$1 to \$55 gold per ton. A crosscut will be driven from the 500' level to cut the 6 veins known on the property. Equipment includes a 30-h. p. steam hoist and a gasoline engine.

COPPER & SILVER ZONE MINES. ARIZONA

W. R. Martin, owner; Union Depot superintendent, El Paso, Texas. Mine near Globe, Gila Co., Ariz., adjoining the Old Dominion and Globe Consolidated mines and near the Boston & Superior. Property, 25 claims, about 500 acres, in diabase area, 1 mile east of Globe, was originally worked for its silver ore, found near the surface, but development has proven the existence of copper at depth and owners expect to encounter the extension of the Gladiator vein of the Old Dominion mine.

Development is by the 103' Clark and 108' Faugh shafts on the Old

Ironsides claim, from which ore shipped has returned 1.25 to 3.5% copper, \$19 to \$236 silver, or an average of \$21.60 per ton.

COPPER STATE MINING CO.

MONTANA

Mine address: Martinsdale, Meagher Co., Mont. Geo. S. Wells, pres. and gen. mgr. Lands, 30 miles north of Martinsdale, have a 200' two-compartment shaft, with crosscuts said to show a 12' vein of ore assaying 5% copper and 16% zinc, with small silver and gold values. Has a hoist and planned installing an air compressor. Developing, with a small force, 1912.

COPPER TOP MINE.

ARIZONA

H. H. Uddel, supt., Phoenix, Ariz. Mine, formerly owned by the Kentucky-Arizona Copper Co., now dead, is in the Rogers Spring district, 20 miles north of Phoenix. Property comprises the Copper Top mine with about 60 claims, developed by 1,000' of workings, showing several small veins of copper ore, treated in a 25-ton smelter on the property.

COPPER & URANIUM MINING CO.

IDAHO

Office: Rexburg, Idaho. Mine office: Clyde, Blaine Co., Idaho. Henry Flamm, pres. and gen. mgr.; M. H. James, vice-pres.; Alfred James, sec-treas.; preceding officers and James Shail, directors. Property, known as the Automatic mine, in the Hamilton district, has a 125' shaft on a 10' contact vein between limestone and quartzite, said to show copper and uranium ores. Company planned driving a 600' tunnel. Presumably idle.

COPPER WEALTH MINING CO.

MONTANA

Address: care Louis Dahn, Sand Coulee, Cascade Co. Had bond on copper claims in Yogo district, near Neihart in 1911. Idle at last accounts.

COPPER WORLD EXTENSION MINING CO.

WASHINGTON

Idle. Mine office: Loomis, Okanogan Co., Wash. Walter A. Boyle, pres.; Edw. H. Caylor, vice-pres.; Alfred F. Carman, sec-treas.; R. J. Thomas, supt., at last accounts. Organized Jan. 11, 1904, under laws of Washington, capitalization \$1,500,000, shares \$1 par.

Lands, 8 claims, area 160 acres, on Palmer mountain, in the Wannicutt lake district, showing an orebody about 25 to 30' wide, opened by a 300' 2-compartment shaft, with crosscut on 210' level said to show 17' vein of chalcopryrite, assaying 8% copper, 4 oz. silver and \$1.40 gold per ton. Equipment includes steam plant, with 2 small hoists and 5-drill air compressor.

COPPER WORLD GOLD MG. & SM. CO.

WASHINGTON

Idle. Office: 401 Columbia Bldg., Spokane, Wash. Mine office: Loomis, Okanogan Co., Wash. Jerome L. Drumheller, pres. and mgr.; John Wentworth, vice-pres. and supt.; S. A. Child, sec-treas. Organized under laws of Washington, capitalization \$3,000,000, shares \$1 par, non-assessable. Lands, 2 claims, patented, lying between the Copper World Extension on the east and the Leadville mine on the west, on Palmer mountain, 4 to 5 miles northeast of Loomis. Property shows a gossan of 100' width, traceable 2,000'. The mine has several short tunnels and shallow shafts, and a 135' two-compartment incline shaft, having a 125' crosscut, reported to be in ore, without reaching the hanging wall, ore being reported to give average assays of 4.5% copper, 2 oz. silver and \$1 gold per ton, with excess of iron.

COPPER ZONE MINING CO.

UTAH

Office: Logan, Utah. Preston A. Thatcher, J. R. Edwards, Edward Edwards, L. J. Goodrich and John Perry, incorporators. Organized 1906, capitalization \$1,000,000, shares \$1 par. No trace of operations securable.

COPPERFIELD CONSOLIDATED COPPER CO.

COLORADO

Mine near Copperfield, Fremont Co., Colo. Idle and moribund. Very fully described Vol. X.

COPPERFIELD MINES.**VERMONT**

Office: 820 Penn Ave., Pittsburgh, Pa. Mine office: West Fairlee, Orange Co., Vt. Geo. Westinghouse, owner. The Ely, or Copperfield mine, once the largest copper mine in the United States, is situated near the village of West Fairlee, and was profitably worked 1870-1890, yielding 7,500,000 lbs. copper in the latter year, but has been idle for many years past. The ore is a mixture of pyrrhotite and chalcopyrite with small amounts of sphalerite and pyrite in a quartzose gangue. It occurs in 2 interbedded lenses in gray schist, the orebodies being 8 to 10' thick, 300 to 400' wide and dipping at about 23°, the 2 lenses together having a length of 3,400'. Development is by a 3,386' shaft, 1,500' vertical, sunk on a 23° incline with various levels. Earlier workings were by tunnel.

Reduction plant includes a combined mill and smelter, connected with the mine by a gravity tram. The smelter has 2 water-jacket blast furnaces, 1 reverberatory furnace and 1 converter stand. Property was worked on a considerable scale, previous to 1860, and was reopened, 1900, by present owner, who spent large sums thereon, but met with disappointing results, the best ore having been stoped, ore growing markedly leaner with depth. The mine has perhaps 20,000 tons of low-grade ore in sight.

COPPERFIELD MINING CO.**UTAH**

Office: Hotel Utah Bldg., Salt Lake City, Utah. B. F. Grant, pres.; Jas. Chipman, vice-pres.; Thos. M. Wheeler, sec. Organized 1906, under laws of Utah, capitalization \$100,000, shares 10 cts. par, assessable. Lands, 9 claims, in the Silver Island district, 20 miles from a railroad, having several shallow shafts and short tunnels aggregating about 250'. Idle several years.

COPPERMINES CO.**NEVADA**

Office: 14 Wall St., New York. Mine office: East Ely, White Pine Co., Nev. Frank W. Holmes, pres.; H. F. J. Knobloch, vice-pres.; Theo. L. Herrmann, sec.; John Josten, treas.; L. Timmermann, asst. treas.; preceding officers, Ralph C. Lupton and E. N. Skinner directors; Arthur Smith, agt.

Organized June, 1907, under laws of Delaware, capitalization \$50,000,000, as Consolidated Copper Co. and name changed, 1907, to present title, and capitalization increased, April, 1908, to \$60,000,000 and decreased, Dec. 31, 1909, to \$5,000,000, shares \$5 par. Is controlled by Consolidated Coppermines Co., through ownership of practically entire stock issue.

Lands, 46 claims, about 525 acres, in the Robinson district, taken over Aug. 8, 1907, from Ely Mines Co., also 3,085 acres of ranch lands and mill sites, in the Steptoe valley, and a number of water rights. Equipment includes steam power.

COPPEROPOLIS MINING & LEASING CO.**WASHINGTON**

Idle. Mine office: Keller, Ferry Co., Wash. H. Hibschan, pres.; Geo. P. Garwood, sec. and mgr., at last accounts. Organized 1907, under laws of Washington, capitalization \$3,000,000, shares \$10 par. Lands, 6 claims, 3 fractional, 90 acres, 5 miles west of Keller, opened by a 60' tunnel, showing low-grade chalcopyrite ore. No trace of recent operations secured. Probably out of business.

COPPERROX MINING COMPANY OF ARIZONA.**ARIZONA**

Office: 96 Harris Ave., Providence, R. I. Mine near Courtland, Cochise Co., Ariz. T. F. Gilbane, pres.; Geo. F. Wordley, first vice-pres.; Thomson E. Going, second vice-pres.; Hon. G. W. Esterbrooks, sec.-treas. Organized Jan. 17, 1910, under laws of Arizona, as successor of the Arizona Copper Syndicate of Providence, capitalization \$1,000,000, shares \$1 par.

Lands, 28 claims, 18 patented and 2 mill sites, patented, in the Dragoon

mountains, 3 miles from Courtland. Property is slightly developed, having a 236' shaft and about 500' of tunnels on a contact said to be traceable 3 miles, with surface ores carrying gold and copper, said to assay up to 16.5% copper. Company is merely a holding company and will lease or sell controlling interest.

COPPERSMITH MINING & MILLING CO.

MONTANA

Office: 107 Second St., Moscow, Idaho. Mine office: Lothrop, Missoula Co., Mont. F. W. E. Schmitz, pres. and gen. mgr.; Benton S. Merwin, vice-pres.; Chas. E. Merwin, sec.-treas.; preceding officers, L. N. Tracy and Wm. Schmitz, directors. Organized Jan. 23, 1909, under laws of Idaho, capitalization \$3,000,000, shares \$1 par, nonassessable; issued \$2,200,000.

Lands, 8 claims, unpatented, area 160 acres, being the Coppersmith group of 6 claims and the Inverness group of 2 claims, also a water right and mill site, about 6 miles up Petty creek from Lothrop. Property carries some good timber. The Coppersmith claim shows limestone and quartzite for an estimated width of about 400', and length of about one-half mile, with outcrops yielding 3 to 20% copper ore, that has given assays of 2 to 17% copper. Development is by a 50' prospect shaft and 280' crosscut tunnel said by management to cut merely 300' of silicified limestone averaging but 1% copper. Property also has a number of open cuts and pits, and a 50' shaft, bottomed in ore estimated to average better than 6% copper, with small gold and silver values. The Coppersmith was formerly reported to show 3 main veins, one reported to be over 100' wide at surface, giving ore assaying 2 to 3% copper. The Ety vein, parallel with and 500' from the Coppersmith, is reported as 15' wide.

The Inverness group, 3 miles from Lothrop, has a vein of 3 to 4' width, in quartzite and slate, carrying malachite, chalcopryrite and chalcocite, giving assays of 15 to 17% copper and \$10 to \$12 per ton in combined gold and silver values. Property has 4 buildings, but no power plant, owing to development by tunnel. Idle except for annual assessment work, and property not considered encouraging.

CORAM SMELTER.

CALIFORNIA

Owned by Balaklala Consolidated Copper Co., at Coram, Shasta Co., Cal.

CORBIN COPPER CO.

MONTANA

Office: 60 Congress St., Boston, Mass. Mine office: Butte, Mont. R. M. Edwards, pres. and gen. mgr.; Henry Tolman, treas., Newton, Mass.; preceding officers, Jos. C. Walker, S. L. Powers, I. J. Sturgis and H. B. Byrne, directors.; Thos. A. Varden, supt.; R. A. Tregonning, engr. Organized Dec. 24, 1908, under laws of Michigan, capitalization \$3,750,000, shares \$25 par, assessable; issued, \$3,250,000, \$7 paid. Company sold 15,000 shares of treasury stock, early 1910, at \$10. Federal Trust Co., Boston, registrar; American Trust Company, Boston, transfer agent. Stock is listed on the Boston curb. Annual meeting, third Tuesday in April. An assessment of \$1 per share was levied, Jan., 1913, and 58,435 shares delinquent stock were bid in by the company and 275 shares sold to individuals at 90 cts. a share. With the stock thus bid in, there will be outstanding 70,000 shares, or \$1,750,000.

The company owns 57 mining claims, 45 patented, near Corbin in Jefferson county, and is exploring under lease and bond 6 claims at Rochester, Madison county, and is now working under an option to purchase the Gambrinus, Belcher and Welch claims at Butte, Mont.

The Corbin group lies at the head of Clancey creek, a few miles west of Corbin, on the western side of an andesite hill across from the Boston & Corbin mine. This property carries several strong fissure veins in

andesite on which considerable exploration work has been done with disappointing results. A vein opened for 800' in the Rosalie tunnel carries up to 20 oz. silver and 7% copper, but is only 18" wide.

The Montana tunnel shows a pyritized conglomerate with andesite, dacite and aplite cobbles, the matrix containing small silver values in the upper tunnel, while the winze in the lower tunnel shows considerable pyrite. The Bonanza tunnel is driven on a tourmalinized granitic dike in andesite, and in places the tourmaline rock carries galena and chalcopyrite with small amounts of zinc-blende and pyrite. The Corbin property is not considered favorably.

Equipment includes steam and electric power, commercial current being taken from the Missouri River Power Co. Buildings include a general office, laboratory, warehouse, three smithies, barn, boarding house, 6 bunk houses and 6 dwellings.

A 100-ton mill, near the portal of the Bonanza tunnel, at Wickes, planned as the first unit of a larger mill, was completed July, 1910, and is idle for lack of ore.

The Butte property lies about 800' west of the Gagnon shaft of the Anaconda Co. and is believed to carry the extension of the vein worked in that mine. Development work on this group is now being actively pushed and a shaft, sunk on the Gambrinus, was 200' deep in September and sinking at the rate of 5' a day. At a depth of 85', a crosscut was driven south 35' to prove the apex of the vein and found it to consist of 2' of quartz and 10' of vein matter, carrying silver-lead ore. This property is held under a \$150,000 option, all paid save final payment of \$105,000 due Jan., 1914.

The Rochester group of 9 claims, is held under bond and lease for \$65,-000, payable Feb., 1914. The property shows a strong quartz outcrop, the vein being developed by a 523' shaft in which a crosscut at the bottom level has encountered 2 parallel veins, 15' apart, that assay 3 to 7% copper. Property is locally known as the Blowout mine.

CORBIN-COPPER KING MINING CO.

MONTANA

Office: State Savings Bank, Butte, Mont. Mine address: Corbin, Jefferson Co., Mont. W. H. Hall, pres.; W. D. Gibson, vice-pres.; R. M. Depeu, sec.; R. B. Nuckolls, treas.; preceding officers, I. A. Heilbronner and M. H. Schultze, directors. Organized 1911, under laws of Montana, as successor to the Montana-Corbin Copper Co., capitalization \$1,000,000, shares \$5 par; issued 100,000 shares. Stockholders of the Montana-Corbin Co. received a new share for old on payment of 25 cts. a share.

Lands, 2 claims, area 26 acres, about 1 mile from Corbin, in Picnic gulch, show 4 well-defined veins carrying auriferous and argentiferous bornite and chalcopyrite averaging about 10% copper, 20 oz. silver and 50 cts. gold per ton. Principal development consists of a 2-compartment shaft, 400' deep, with about 500' of workings, on the Hidden Treasure claim, and several pits and shallow shafts on the Copper King claim. There are also several short tunnels.

Equipment includes two 60-h. p. boilers, a 15-h. p. hoist, and a 5-drill electric air compressor. Idle since organization.

A full report on this property was made, 1911, by Alfred Frank, E. M., supplementing earlier reports by E. P. Jennings, E. M., and L. S. Ropes, E. M.

CORBIN METAL MINING CO.

MONTANA

Office: Pittston, Pa. Mine office: Corbin, Jefferson Co., Mont. J. H. Foye, pres.; John Hoy, vice-pres. and gen. mgr.; Thos. McLaughlin, sec.; M. W. O'Boyle, treas., at last accounts. Organized 1907, under laws of

Montana, as Corbin-Montana Copper Co., changing name, Jan., 1910, to present title, capitalization \$1,000,000, shares \$1 par, nonassessable; issued, \$400,000. Company apparently is a twin of the Jefferson-Montana Copper Mines Co. Windsor Trust Co., New York, registrar and transfer agent. Stock is listed on the New York curb. Annual meeting, second Tuesday in April.

Property, 11 claims, 176 acres, known formerly as the Baldwin mine, 2 miles southeast of Corbin, in the Colorado district. Claims show 5 fissure veins ranging from a few inches to about 8' in width, cutting granite. Ores carry chalcopryrite, bornite and galena, estimated by company to average 4% copper, 8% lead, 5 oz. silver and \$2 gold per ton. Development is by a 500' two-compartment incline shaft with considerable drifting on 500' level, cutting a small orebody carrying lead-zinc-copper sulphides, and by several short tunnels.

Equipment includes an 8x10" electric hoist, good for 1,000' depth and a 10-drill air compressor, taking current from the Missouri River Power Co. There are 6 buildings including carpenter shop, smithy and change house.

CORBIN-PENNSYLVANIA MINING CO.

MONTANA

Idle. Mine office: Corbin, Jefferson Co., Mont. Frank E. Richards, pres.; H. M. Brooks, sec.-treas.; H. E. Emerson, supt. Organized May, 1910, capitalization \$500,000. Lands, 6 claims, 2 patented, east of the Alta mine, including the Flambeau mine, an old property with a 120' two-compartment shaft, having a little crosscutting on the 100' level, and the Alta Extension mine, having a 150' shaft. Property is said to carry chalcopryrite ore assaying 6% copper and 12 oz. silver per ton.

CORBIN-VALPARAISO COPPER MINING CO.

MONTANA

Idle. Mine office: Corbin, Jefferson Co., Mont. A. G. Grosso, H. J. Dewey, Thos. F. Casey, J. P. Daly, Frank W. Richards and G. P. Paul, directors. Organized 1907, capitalization \$1,000,000, shares \$1 par. Mine, on Big Valparaiso mountain, has tunnels of 600' and 800', latter with back of about 780' cutting 4 veins, showing ore assaying 3 to 8% copper, with average assays of 26 oz. silver and \$3 to \$9 gold per ton. Mine made small ore shipments, 1885, under former ownership.

CORBIN-WICKES COPPER MINING CO.

MONTANA

Office: 19 East Broadway, Butte, Mont. Mine office: Wickes, Jefferson Co., Mont. I. N. Symons, pres.; W. C. Dierks, vice-pres.; J. L. Meixell, sec.; Edwin L. Mayo, treas. Organized Sept., 1904, under laws of Montana, capitalization \$1,000,000, shares \$1 par; issued, \$550,000.

Property, sundry claims, in Picnic gulch, near Wickes, developed by several tunnels, principal work being the Bunker Hill tunnel No. 4, 900' long. Claims show a gray-blue andesite intruded by granitic rocks and showing leaching and other evidence of thermal metamorphism. The main tunnel exposes disseminated grains and films of sulphides, carrying galena, sphalerite, chalcopryrite and pyrite, all of primary character. The 300' band of leached rock seen on the surface has not been cut below. Property considered unpromising.

CORDONERA MINING CO.

MEXICO

Mine office: Suaqui Grande, Sonora, Mex. W. S. Morrow, mgr., at last accounts. Has argentiferous copper ores, with steam power and a 5-stamp mill. Idle, on account of unsafe condition of country, due to revolution.

CORDOVA COPPER CO.

ARIZONA

Office: 500 Lonsdale Bldg., Duluth, Minn. Mine office: Globe, Gila Co., Ariz. Henry B. Hovland, pres.; Hoval A. Smith, vice-pres.; David L.

Fairchild, treas.; Harvey P. Smith, sec. Organized May, 1909, under laws of Arizona, capitalization \$3,000,000, shares \$10 par; issued, 100,704, fully paid; 77,069 outstanding, \$2 paid. Company owed about \$63,000 at last reports. Annual meeting, second Tuesday in September. Company was formed to take over the property and options of the Globe Consolidated Copper Co., now owning 98% of the stock of that company and also an option on the Eureka group of 130 acres, adjoining the Miami Copper Co.'s mine. Churn drilling and other work on this group proved disappointing and the option was given up. The Globe Consolidated had options on 1,075 acres, of which 800 acres have reverted to the original owners.

The Globe Consolidated property includes the Globe-Boston group of 21 claims, the Mallory group and other holdings aggregating 270 acres, north of the Old Dominion mine and west of the Arizona Commercial. Development is by the 1,225' three-compartment Gem shaft with extensive crosscuts on the 1,100' and 1,200' levels, cutting the Gem and Future veins, which have shown a little ore occasionally, but nothing of commercial size.

Shipments were made in 1909-10 coming from a vein 5 to 8' wide on the 1,200' level, whose average value was 3.35% copper, 33% iron, 35% sulphur with \$1.30 in gold and silver.

Equipment includes a good hoist and a 12-drill air compressor. Management has struggled faithfully to make a mine, both east and west of Globe, but is out of funds and the property idle since 1910, with rather poor prospects.

CORNELIA MINING CO.

MONTANA

Mine address: Sheridan, Madison Co., Mont. Daniel Argo, supt. Property on Wisconsin creek, 12 miles from Sheridan, known as the Roach group, is developed by several tunnels showing gold and silver-bearing copper ores. Equipment includes a small mill, 2 miles from the mines. Company employs about 10 men.

CORNELL MINE.

BRITISH COLUMBIA

Address: Van Anda, Texada island, B. C. Property originally operated by Texada Consolidated Mines, transferred to the Northern Texada mine and held under option in 1911 by the Tyee Copper Co., has reverted to its original owners. The mine carries high-grade bornite ore in marmorized limestone near a granite contact, the geological conditions greatly resembling those of the near-by Marble Bay mine. It is developed to 500' level and equipped with steam hoist and compressor.

CORNWALL COPPER MINING & SMELTING CO.

MISSOURI

Mine office: Sainte Genevieve, Mo. Property in Sainte Genevieve county, shows numerous ore deposits in fissure zones, dipping, as a rule, about 5°. Ores are mainly chalcopryite, giving average assay values of about 8% copper. Company owns and operates a 3-mile railroad, connecting with the Illinois Southern railway, and employs about 80 men.

CORONA COPPER CO.

ARIZONA

Office: Pittsburgh, Pa. Mine office: Wenden, Yuma Co., Ariz. J. H. McClaren, pres.; Samuel A. Butler, mgr.; Geo. E. Pressler, supt., at last accounts. Organized under laws of Arizona, capitalization \$1,500,000, shares \$1 par.

Property, 54 claims, unpatented, 23 miles northwest by wagon road from Wenden, in the Bill Williams district. The Chicago, Mammoth and Copper Glance claims are the only ones developed. The Chicago has a 400' tunnel and 125' shaft on a vein a few inches wide in gneiss. The vein filling is barite with chrysocolla, hematite and a little fluorite. The

Copper Glance 60° inclined shaft, 200' deep, is sunk on a vein a few inches wide in a shear zone. The vein proper carries hematite and magnetite with copper silicate and chalcopyrite. The Mammoth claim has a short, inclined shaft sunk on the contact between erosion breccia and gneiss and showing traces of copper. Property considered unpromising.

CORONA QUEEN MINING CO.

NEW MEXICO

Idle. Office: 21 Great Winchester St., London, E. C., Eng. Mine office: Corona, Lincoln Co., N. M. Hon. Miguel A. Otero, pres.; W. R. Amis, sec., at last accounts. Organized Jan., 1907, capitalization \$2,000,000, shares \$5 par, fully issued. Apparently control is owned in England. Lands, 41 claims, area 820 acres, in the Red Cloud district of the Gallinas mountains, 12 miles west of Corona, the nearest rail point. Property is said to have a considerable surface showing of iron ore, apparently of commercial grade, and copper specimens assaying up to 67% have been found.

CORONADO GOLD & COPPER MINING CO.

ARIZONA

Office: Prescott, Yavapai Co., Ariz. W. T. Sawyer, supt. Lands, 14 claims, area 285 acres, including the Black Warrior group, in the Black Hills district, 15 miles south of Jerome, are said to show considerable ore.

CORONADO MINE.

ARIZONA

Mine address: Price, Pinal Co., Ariz. Property in the Mineral Hill district, 10 miles from Price, developed by a 300' shaft, shows a lens of copper ore at depth of 260' in the shaft, said to carry up to 70% copper. Ore is mainly bornite. Equipment includes a 25-h. p. gasoline hoist, and an air compressor.

CORONADO MINING CO.

ARIZONA

Mine office: Clifton, Graham Co., Ariz. K. D. Brown, supt. Organized July 12, 1902, under laws of Maine, capitalization \$1,000,000, shares \$1 par. Is controlled through ownership of a stock interest of about 53%, by the Shannon Copper Co., and the remainder of the stock is held principally by Phelps, Dodge & Co. Officers and management are the same as those of the Shannon Copper Co.

Lands, 23 claims, 400 acres, patented, near Metcalf and adjoining the mines of the Detroit Copper Mining Co. and the Coronado mine of the Arizona Copper Co., Ltd. Mine has a 2-compartment shaft, on the Garnet claim, showing a fair body of auriferous and argentiferous chalcopyrite on the 200' level. The Emerald mine shows a considerable body of ore, claimed to give average assays of 9% copper, which probably is too high. The mine also has several other shallow shafts, and short tunnels. Was in the hands of leasers, at last accounts.

CORPUS CHRISTI NUEVA; COMPAÑIA MINERA DE.

MEXICO

Mine office: Matehuala, Catorce, San Luis Potosí, Mex. W. B. A. Dingwall, pres. and mgr., at last accounts. Mine has auriferous copper and argentiferous silver ores, developed by an 1,800' tunnel. Idle several years.

CORRALES MINING & MILLING CO.

MEXICO

Mine office: Rodeo, San Juan del Rio, Durango, Mex. Mine carries auriferous copper ore. Equipment includes a small steam plant. Was a small producer, about 1909. Presumably idle.

CORTEZ ASSOCIATED MINES.

MEXICO

Office: 53 State St., Boston, Mass. Mine office: Jacala, Hidalgo, Mex. Joseph S. Fay, pres.; Olof Wenstrom, vice-pres.; Freeman Hinckley, sec-treas.; preceding officers, Wm. R. Fay, Robt. A. Manning and Philip W. Wrenn, directors. Organized Jan. 3, 1910, under laws of West Virginia, capitalization \$1,500,000, shares \$3 par, nonassessable; issued, \$825,000. Company began business with \$275,000 cash, and Dec. 31, 1911, had on hand

\$35,038 cash loans and accounts receivable. Boston Safe Deposit & Trust Co., transfer agent. Stock is listed on the Boston curb. Annual meeting, first Tuesday in March.

The Cortez Associated Mines is primarily a development and holding company formed to explore and develop mining properties until they are ready to produce, and then to promote an operating company. Lands, 1,684 pertenencias, area 4,160 acres, in 4 groups, principal holdings being in the Jacala district, with lesser holdings in the districts of Zimapan and Ixmiquilpan, about 20 miles distant. The lands include the entire old mining camp of Jacala.

Zimapan is 85 miles north of Mexico City and Jacala is 35 miles north-east of Zimapan, this place being 43 miles from Sayula on the National railroad. A new railroad is expected to reach the town within the next year.

The Jacala property shows thickly bedded blue limestone intruded by granular monzonite with alteration along the contact and mineralization of the metamorphosed limestone by copper and silver-lead sulphides. The intrusive mass is $1\frac{1}{4}$ miles long and 700' wide. The contact zone carries numerous orebodies showing chalcopyrite and magnetite below the 300' zone of oxidation.

Careful exploration has shown that most of the ore shoots are low in copper and carry but 1 to 3 oz. in silver. At the Santa Maria ore shoot, the copper ore is found in a narrow chimney of 4 or 5% ore; in the Humboldt and Abeja, there are a few thousand tons of 4% ore. The main development is by the Cortez 1,770' tunnel, which has opened up about 35,000 tons of pyritic ore containing magnetite and chalcopyrite, the average copper contents being 1.72%. Several hundred thousand tons may possibly be developed here, and as the ore contains 50% iron, it will be valuable for a flux.

The Humboldt, Cortez, Abeja and Santa Maria show promise of making producing mines. The Humboldt has a magnetite-garnet outcrop, explored by the 1,304' Humboldt tunnel with drifts and a 130' incline winze, mostly in ore. The Santa Maria 394' shaft has developed a body of soft, leached copper-bearing gossan of 6,000 sq. ft. area. This shaft will connect with the Humboldt tunnel.

The Abeja shaft, 50', sunk 1912 through altered limestone to porphyry contact, shows massive, porous magnetite with chalcocite and oxidized copper minerals. This work will connect with the Cortez tunnel. The Gallo mine, east of the Humboldt, has a 350' shaft, connecting with the Humboldt tunnel, 1,055' from the portal.

Small silver-lead replacements in limestone also occur at Jacala, but the Carmen mine is the only one of promise. This is a well-known old producer, $1\frac{1}{2}$ miles north of Jacala, that yielded 40 oz. silver-lead ore for many years. The mine workings are on the contact between limestone and porphyry and have developed a replacement chimney of silver-lead ore in limestone, worked by an incline shaft to a depth of 900'. The company's new work has not yet cut the downward continuation of this ore shoot.

The San Nicolas group, including the Soledad mine, Ensino Largo and Maravillas, has been reopened. The Ensino Largo, 6 miles from Jacala, shows irregular replacements of rich silver-lead ore in crystalline limestone developed by a 900' tunnel. This tunnel will also develop the Soledad mine. The Maravillas tunnel, 1,039' long, at the end of 1912, was opening up another low-grade orebody.

Zimapan lies in a broad, arid valley with the 4,000' deep Moctezuma

canyon 9 miles west and the 3,000' deep Tolima canyon 6 miles west. The mines lie in the Tolima canyon and on the ridge between it and the Moctezuma river. The ore deposits appear around a small intrusion of monzonite porphyry either as contact deposits carrying copper, or silver-lead deposits in the surrounding limestone, especially along fissures and intrusive dikes. The latter form pipes, or chimneys, either vertical or inclined. The silver-lead properties have little value under present conditions of transportation. The copper properties at this place are practically undeveloped, but a contact deposit showing disseminated copper pyrite, zinc blende and galena, promises to develop a large tonnage.

The Sirena lead-antimony mine lies 9 miles northeast of Zimapan. The ore occurs as a bedded deposit in flat-lying Cretaceous limestone, cut by a porphyry dike. The ore is massive and consists of pyrrhotite, arsenopyrite and jamesonite, forming an orebody 700' long and 30' thick. It is estimated that it contains 1,000,000 tons of lead-antimony ore averaging 7.8% lead. This deposit is considered very valuable and could be easily mined by a shallow shaft and workings.

Costs for development in 1912 averaged \$5.59 per foot for all underground work. New work averaged 662' per month with 263 men employed. Total of new work in April, 1913, was 21,458, with 2,465' of core drilling.

Property is ably managed and with the erection of a smelter, now proposed at Zimapan, promises to have a successful career.

COVE LAND & MINING CO.

MICHIGAN

Office: 122 Winder St., Detroit, Mich. L. O. Broadwell, pres.; H. A. McPherson, sec. Lands are on Isle Royale. Idle many years.

CRANDALL COPPER MINING CO.

WYOMING

Office: Red Lodge, Mont. R. J. Fleming, pres.; Walter Alderson, sec. Property, 13 claims, in the Clark Fork district, developed by a 150' tunnel and shallow shaft, shows low-grade gold and silver-bearing copper ore.

CRESCENT COPPER CO.

ARIZONA

Mine near Patagonia, Santa Cruz Co., Ariz. Organized Dec., 1910, by California interests. Lands, in the Washington camp, Patagonia mountains, developed by tunnel, showing copper ore.

CRESCENT COPPER MINING CO.

WASHINGTON

Office: 516 Peyton Blk., Spokane, Wash. Mine office: Twisp, Okanogan Co., Wash. D. C. McFee, pres.; Frank R. Creighton, mgr., at last accounts. Lands, 42 claims, unpatented, near the headwaters of the Twisp river, about 100 miles southwest of the Granby, show ores carrying chalcoppyrite, bornite and quartz.

Development is mainly by tunnels, and equipment includes a Samson turbine, electric plant and saw mill. Company plans driving a 1,600' adit tunnel to crosscut the vein on the 1,300' level. A large compressor and hydro-electric plant will be installed next spring.

CRESTON COPPER CO.

MEXICO

Mine office: Suaqui de Batuc, Ures, Sonora, Mex. I. N. Kellogg and G. B. Floyd, directors. Lands, 10 groups, area 1,236 hectares, near Campo Santo Niño, in very rugged hills in the Ures and Sahuaripa districts. Property shows contact deposits between limestone and quartz porphyry and granite, carrying auriferous and argentiferous copper ore, with quartz-porphry gangue, opened by shafts and tunnels. Presumably idle.

CRÆSUS GOLD & COPPER MINING CO.

IDAHO

Office: Beatrice, Neb. Mine office: Hailey, Blaine Co., Idaho. F. H. Plummer, sec.; Henry Olander, supt. Mine, 4 miles west of Hailey, has an 800' three-compartment vertical shaft, on a 20 to 60' fissure vein of

nearly vertical dip, in granite, having pay streaks on both walls, carrying chalcopryite, with values mainly in gold. There also is a nearly vertical blind vein, apparently joining the main vein at depth, carrying silver-lead ore at depth of 600'. Equipment includes steam and electric power, and a 12-drill electric air compressor. The 100-ton concentrator has 10 stamps, crusher, rolls and Huntington mills.

CROWN BUTTE MINING & SMELTING CO.

ARIZONA

Organized Sept., 1913, under laws of Arizona, capitalization \$3,000,000. Property, the Birch-McNulty group of 150 claims, on Big Copper creek, a branch of the Hassayampa river, 10 miles from Prescott, Yavapai Co., Ariz.

CRYSTAL GROUP.

MONTANA

Address: care Alex. J. Johnson, Clarke Bank, Butte, Mont. Mine in Cataract district, Jefferson Co., Mont. G. D. Beattie, of Helena, owner. Property is said to be under lease and bond to A. C. Ray and Alexander J. Johnston, of Butte. The mine is opened by a 100' tunnel, showing an orebody said to be 30' wide and opened for 500', carrying gold and silver-bearing copper ore with about 6% copper, 15 to 20 oz. silver and \$5 to \$8 gold per ton.

CUARTAS MINING CO.

MEXICO

Office: Railway Exchange, Chicago, Ill. Mine office: Ayutla, Atlán, Jalisco, Mex. Harry McIntosh, pres.; Wm. T. Sheffield, sec.-treas.; Robt. S. McIntosh, supt. Capitalization £300,000. Property is the old Cuartas mine, in the Bautista district, area 250 acres, also sundry adjoining timber lands. Mine is an antigua, worked by the Spaniards, and abandoned, A. D. 1745, at depth of 275', on account of water and base ore. The veta madre of the Cuartas is about 30' in average width, carrying mainly silver and gold values. Idle several years and presumably moribund.

CUATRO GRANDE MINING CO., S. A.

MEXICO

Is the Mexican incorporation of the Pittsburg & Sonora Dev. Co.

CUBA COPPER CO.

CUBA

Office: 2401-60 Wall St., New York. Mine office: El Cobre, Santiago de Cuba. Benj. B. Lawrence, pres.; Colgate Hoyt, vice-pres.; I. W. Hunter, sec.; W. T. C. Carpenter, treas.; Edw. H. Emerson, gen. mgr.; Edw. B. Nagle, supt. Organized Jan. 5, 1907, under laws of West Virginia, as successor of El Cobre Mines, capitalization \$2,000,000, shares \$100 par, in \$1,500,000 non-cumulative 6% preferred and \$500,000 common stock. Annual meeting, first Tuesday in March.

This was the first copper mine in the new world worked by white men, having been opened A. D. 1532 by the Spanish, the first copper from El Cobre mines having been used for casting Spanish cannon. The properties were taken over, about 1832, by a Hispano-English company, and ore mined was shipped to Swansea for reduction. The custom-house records of Santiago are said to show exports of 610,210 tons of ore, 1851-69, valued at \$50,186,225, probably in depreciated Spanish currency, the ore shipped assaying from 12.69% upwards, and probably averaging about 16% in copper tenor. In 1844 El Cobre railway was built, the Queen of Spain being the principal shareholder. The property shows the remains of an old stamp mill, remaining from former operations. During the revolt of 1868-1878, the big Cornish pump was burned, flooding the mines, which remained idle until taken over, 1902, by the predecessor of this company. Immediately after the Spanish-American war, the property was denounced by F. D. Pagliuchi and financed by Wm. Astor Chandler and associates, who had much trouble handling the great amount of water and in opening up the orebodies.

Lands are extensive, lying 8 miles west of Santiago bay, and showing a mineralized zone of 200' width, traceable 6,500', carrying 3 parallel veins with much altered intervening rock. Ore carries chalcopryrite, associated with pyrrhotite, in a quartz gangue, the grains of chalcopryrite frequently being coated with covellite. Ore occurs in lenticular shoots, along fracture planes, in serpentine, the largest lenses being about 30' in extreme width, with length of 200', lenses averaging about 7' width with occasional widenings to 20' and even 30'. The oxidized zone is of 50 to 75' depth only, succeeded by sulphide ores averaging 4 to 5% in copper tenor, without either gold or silver in important quantities.

The old workings were extensive, including some 40 old shafts, with numerous remains of old hoists and boilers. The 4 deepest old shafts were about 1,200' each, with 17 miles of workings, timbered mainly with mahogany, and the mine was found in bad shape, requiring heavy retimbering, as many of the old stopes, up to 20' and 30' in width, had caved. A very serious cave, 1906, shut off the lower workings for some time. During the rainy season the mine makes 500 to 1,200 gals. per minute of strongly acid water, requiring pumps of bronze, with lead or wood-lined pipes. The mine has pumps with a combined capacity of 5,000 gals. per minute, and the water, from the mine was formerly run over scrap iron, producing considerable cement copper, but this has been discontinued, owing to cost and because the mine water formerly carrying 400 grams copper per ton now carries only 50. Owing to water and bad timbering, only the upper portions of the mine were worked for some years, but the workings are now below the 1,200' level and open virgin orebodies. The mine has considerable ore blocked out, averaging about 4% copper, and the old waste dumps contain about 250,000 tons of 2% discarded material.

El Cobre railroad, 9 miles long, connects the mine with Punta Sal, on Santiago harbor, and is equipped with 2 locomotives and 40 cars.

The reduction plant, at Punta Sal, includes a 440-ton concentrator with 4 largest size Hardinge mills for grinding the ore for the new flotation plant, and a 250-ton smelter, latter idle for several years. Forces are about 450 men. Ore of about 4.5% average copper tenor is shipped for smelting to the Norfolk smelter.

Property produces about 5,000,000 lbs. of copper annually and now after many years of difficulty, is attaining good results.

CUBA MINING & DEVELOPMENT CO.

WASHINGTON

Office: 3 Wolverton Blk., Spokane, Wash. Mine office: Kettle Falls, Stevens Co., Wash. H. Yake, mgr. Organized Nov., 1908, under laws of Washington, capitalization \$1,500,000, shares \$1 par. Lands, 12 claims, area 240 acres, in the Covada district, 10 miles south of Kettle Falls, and 1 mile west of the Columbia river, nearest railway point being Myers Falls, 14 miles northeast. Property is in 2 groups, one, of 5 claims, being a tunnel site, near the Columbia river, and one, of 7 claims, carrying about a mile and half-mile, respectively, of the strike of 2 veins, of 12' and 24' estimated average width, in porphyry. The mine has a 142' incline shaft, a 275' tunnel, and an open cut. The vein, of 24' estimated average width, carries argentiferous and slightly auriferous galena, and the 12' vein carries argentiferous copper ore. No report received, 1913.

CUBAÑA CONSOLIDATED COPPER CO.

MEXICO

Idle. Mine office: Arizpe, Sonora, Mex. Geo. H. McLean, mgr., at last accounts. Organized Jan. 6, 1903, under laws of Arizona, capitalization \$500,000, shares \$1 par. Lands, 244 hectares, bought for \$20,000, showing 6 orebodies, of 4 to 20' width, of which 3, carrying estimated values of 12% copper, 10 oz. silver and \$2 gold per ton, are opened by 6 shafts, deepest

102', and by a number of tunnels, longest 250' and 575', with a total of 1,415' of underground openings. Mine is about 30 miles from Cananea, the nearest railroad point, and is connected therewith by a good wagon road. Sample carload smelter shipments returned 23% copper, with fair gold and silver values. Property considered promising.

CUCHARA; COMPAÑIA MINERA.

MEXICO

Mine office: Culiacan, Sinaloa, Mex. Lands show gold, silver, copper and lead ores. Idle several years.

CUCHARAS MINING CO.

MEXICO

Mine office: Acaponeta, Tepic, Mex. J. M. Winston, mgr., at last accounts. Lands are the San Juan y Anexas mines, in the municipality of Huajicori. The San Juan mine, opened by shaft and tunnel, has argentiferous copper ore. Equipment includes steam power, and a smelter, having a 40-ton wood-burning reverberatory furnace.

CULLOWHEE MINING & REDUCTION CO. NORTH CAROLINA

Office and mine: Cullowhee, Jackson Co., N. C. S. B. Ezell, pres.; D. D. Davies, vice-pres.; Thos. A. Cox, sec. and managing director; Chas. Davies, smelter supt., at last accounts. Organized 1905, as successor of Cullowhee Copper Co.

Lands, 1,300 acres, 12 miles from Sylvia, nearest rail point, showing a considerable body of sulphide ore, claimed to average about 5% copper and \$4 gold per ton, with occasional assays of 15% copper, which figures are probably correct for small lots of ore, but cannot be realized from a large tonnage. Equipment includes hoists and a Sullivan air compressor, with steam and water power, latter with a plant 3 miles from works. The smelter, near Sylvia, of 30 tons daily capacity, blown in Jan., 1909, with semi-pyritic smelting, suspended operations late 1910, and probably will remain idle until rail connections are secured.

CUNNINGHAM PASS COPPER MINING CO.

ARIZONA

Mine office: Wenden, Yuma Co., Ariz. Harold Baxter, pres. and gen. mgr.; J. W. Boone, vice-pres.; H. G. Mayer, sec.-treas., at last accounts. Organized Feb. 11, 1908, under laws of Arizona, capitalization \$1,000,000, shares \$1 par, nonassessable; issued, \$600,000.

Property, in the Harcuvar mountains, 12 miles north of Wenden, shows granite, diorite and schist, carrying ribbons of quartz with several small orebodies, of which one, under development, ranges 3 to 26" in width and is traceable 2,000' carrying chalcocite, estimated by management to average 12% copper and 1 oz. silver per ton.

The old workings of the Critic shaft show stopes on an orebody 70' long, 40' high and 2½' thick that was a mixture of quartz and chalcopryite with some glance. Beyond the stope, the vein narrows to a few inches. In the bottom level, 400', the vein is lean and shows but 12" of lean primary sulphide ore for a few feet in length. The conditions are unpromising. The Gold Hill vein is 4' wide and developed by a 100' shaft showing a strong vein with small gold values.

In 1912-13 two sets of leasors have tried in vain to pay expenses by working these narrow veins. The property was taken over by a young engineer with more enthusiasm than judgment. It is without merit, even as a development proposition.

CUPRIC MINES CO.

UTAH

Office: 17 Battery Place, New York. Operating office: 206 Templeton Bldg., Salt Lake City, Utah. F. A. Bishop, sec.; M. C. Morris, mgr. Organized May 11, 1908, under laws of New York, capitalization \$1,000,000, shares \$1 par, assessable; issued, \$500,000. Is affiliated in finances and is managed by the Horn Silver Mining Co.

Owens the Cupric, or Iron Devil mine, with 16 claims, unpatented, in the Frisco district, Beaver county, adjoining the Peacock mine. Property is at the east end of White mountain and 2 miles southeast of Newhouse. The mine is near the igneous contact, dikes and tongues of monzonite invading the limestone; there are numerous mineralized fissures carrying chalcoppyrite, pyrite, specular hematite and magnetite with garnet, tremolite, muscovite, etc.

Developed by 2 old incline shafts and a new 425' two-compartment vertical shaft, sunk near the main tunnel of the Cactus mine. Property has good ore, but not in large enough quantity to make mine profitable.

CUPRITE COPPER CO.

ARIZONA

Inactive. Mine near Clifton, Graham Co., Ariz. N. W. Lord, pres.; Isaac N. Stevens, vice-pres.; L. B. Kauffman, sec.; Geo. B. Kauffman, treas.; Frank A. Ray, engr.; preceding officers and Frank B. Laine, directors. Organized March, 1904, under laws of Arizona, capitalization \$1,000,000, shares \$1 par.

Lands, 26 claims, area 490 acres, in the Copper Mountain district, opened by shafts of 30' and 320' and by tunnels of 150' and 260', showing orebodies of 5 to 100' width. Work has been done in the leached zone, which carries isolated pockets of rich ore, from which sundry small shipments have given returns of 15 to 30% copper, and up to \$5 gold per ton. Company also owns about 2,000 linear feet of strong hematitic outcrops, ranging 5 to 100' in width. It is likely that the copper veins, which are parallel with and similar to the Big Coronado vein of the Arizona Copper Co., are leached to very considerable depths, but prospects for developing large bodies of low and medium-grade sulphides at depth seem good. Property considered promising, but company inactive, awaiting developments on adjacent properties.

CUPRITE COPPER MINING CO.

MONTANA

Mine near Marysville, Lewis and Clark Co., Mont. P. L. Reece, pres. and mgr. Lands, 6 claims, about midway between Helena and Marysville. show copper and lead ores, carrying gold and silver values. Development is by a shaft, 200' deep, May, 1913.

CURLEW MINE.

MONTANA

Office: care A. M. Holter, owner, Butte, Mont. Mine office: Victor, Ravalli Co., Mont. Mine, formerly a silver producer, also shows zinc ores, and a vein claimed to be 12' wide, is said to show ore carrying 10% copper, with lead, silver and gold ores, opened 1906. Idle several years.

CURTZ CONSOLIDATED MINES CO.

CALIFORNIA

Office: 233 Bacon Bldg., Oakland, Cal. Mine office: Markleeville, Alpine Co., Cal. J. G. Hanschildt, pres.; B. A. Snedker, vice-pres.; H. H. Jamison, sec.; Peter Curtz, gen. mgr.; preceding officers and H. F. Sack, directors. Organized April, 1906, under laws of Arizona, capitalization \$1,000,000, shares \$1 par; issued, 915,000.

Property, the Curtz and Morning Star mines with 20 claims, 320 acres, including a 20-acre mill site, in the Mogul, or Loope district, 10 miles east of Markleeville and 28 miles from the Virginia & Truckee railroad. Claims cover disseminated or "porphyry" copper deposits in porphyry with rhyolite and andesite near by. The ore zone is 40 to 60' wide, runs northeast and dips at 45° and is traceable 3,600'. Two orebodies under development extend to deepest workings, 350'. A large amount of ore blocked out is said to average 3% copper, 20 oz. silver and \$2 to \$20 gold per ton. Development is by a 300' shaft and 4 tunnels, with about 7,520' of workings, estimated to block out 2,000,000 tons of concentrating ore.

Equipment includes a 30-h. p. steam hoist, 20-stamp mill of 100 tons daily capacity, operated by 220-h. p. water power and several mine buildings.

CUSTER CONSOLIDATED MINING CO.

IDAHO

Mine office: Wallace, Shoshone Co., Idaho. Harry L. Day, pres.; Jerome S. Day, vice-pres., sec. and treas., at last accounts. Organized July, 1910, under laws of Nevada, capitalization \$1,000,000, shares \$1 par. Property, near the Tamarack & Chesapeake mine, has been acquired by stock control by the Day Bros. and combined with the Tamarack & Chesapeake, is being prepared for active development and ore extraction. Property a good one and management excellent.

CUSTER PEAK MINING CO.

SOUTH DAKOTA

John O'Brien, supt., Albany, Lawrence Co., S. D. Owns the Jungle mine at the southeast base of Custer peak, showing a porphyry dike cutting schist with 5' of copper ore on both walls. Development includes 65' and 90' shafts, latter showing an 8" streak of nearly solid malachite on the 60' level. New work in 1913 disclosed high-grade gold ore. The older holdings of the company, 1½ miles from the Jungle mine and southwest of Deadwood are said to carry average values of \$6 per ton in oxidized ore to depth of 100', changing below to pyrite and chalcopyrite, showing on the 200' level, a vein of 85' width, assaying about 1% copper with very little gold, but increasing at slight depth, to 3% copper.

CYMRU COPPER CO.

ALASKA

Idle. Office: 117½ South Tenth St., Tacoma, Wash. Mine near Baldwin, Prince of Wales island, Alaska. J. M. Miller, Jr., pres.; F. P. Hicks, vice-pres.; Frank D. Nash, sec.-treas.; J. Cuthbert Welch, mgr.; A. I. Jones, supt., at last accounts. Organized 1905, under laws of Washington, capitalization \$50,000, shares \$1 par.

Property, 6 claims, 100 acres, on Moira sound, showing 3 lenticular orebodies, reported by company as of 40' aggregate width, assaying 6 to 10% copper, 4 to 6 oz. silver and \$2 gold per ton, mainly from chalcopyrite ores. Mine has a 100' shaft and a 187' tunnel, with hoist and 6-drill air compressor. A 4,000' surface tram conveys ore to a 1,000-ton ore bin.

DAILEY ARIZONA COPPER CO.

ARIZONA

P. O. address: Oracle, Ariz. Mine at Apache camp, Old Hat district. Company purchased 13 copper claims from Dailey Bros. in May, 1913, land lying between the claims recently bought by the Copper Queen Copper Co. The district is 38 miles north of Tucson in the Santa Catalina mountains, near Oracle.

DAILEY COPPER MINING & SMELTING CO.

MONTANA

Office and mine: Wickes, Jefferson Co., Mont. Wm. W. Dailey, pres.; A. R. Robertson, vice-pres.; C. H. Dailey, sec. Organized Feb., 1907, under laws of Montana, capitalization \$1,500,000, shares \$1 par; issued, \$850,000.

Property, the Atlas group of 5 claims, patented, area 25 acres, having well-defined fissure vein of 12' estimated average width, carrying malachite, chalcopyrite, bornite and chalcocite, estimated by management to average 4% copper, 12 to 60 oz. silver, and 80 cts. to \$3 gold per ton, without lead or zinc. Mine has a 300' shaft, with 1,000' of workings on vein, estimated by management to show 60,000 tons of ore blocked out. Mine water, in small quantities, carries copper sulphate strongly in solution. Former owners shipped about \$30,000 worth of ore. An independent source estimates ore to average about 3% copper, 7 oz. silver and 80 cts. gold per ton. Equipment includes a 40-h. p. boiler and 8x10" hoist, good for 500', with 2 buildings, and a 30-ton test concentrator.

DAIRY FARM MINING CO.**CALIFORNIA**

Idle. Mine office: Van Trent, Placer Co., Cal. E. B. Braden, pres.; Edward Brush and H. B. Underhill, Jr., vice-presidents; Corey C. Brayton, mgr., at last accounts. Organized 1903, under laws of California, capitalization \$200,000, shares \$1 par; issued, \$143,500. Is controlled by American Smelters Securities Co. through ownership of \$96,927 stock.

Lands, 160 acres, on the Southern Pacific railway, show a mineralized fracture zone of 25 to 50' average and 80' extreme width, in rhyolite and andesite, having a N.-S. strike, with dip of 60°, and a hematite gossan carrying a little gold and silver. Upper workings at shallow depth show about 50,000 tons of oxidized ores, amenable to cyaniding, these changing, at depth of 85', to chalcopyrite associated with pyrite, estimated to average about 3.25% copper, and occasionally carrying as high as \$30 gold per ton. Apparently the lens does not extend below a depth of about 500'.

Equipment includes a 750-h. p. electric plant, with a 140-h. p. electric hoist, good for 1,000' depth, and a 20-drill electric air compressor. Buildings, about 25 in number, include a 20x40' wooden machine shop, 30x50' carpenter shop, 20x30' smithy, office, store, boarding house and dwellings.

A small concentrator has Chilean mills, and there is a 100-ton cyanide plant, to treat the auriferous gossan. Survey was made, several years ago, for a railway from Lincoln to Van Trent. Property apparently has proven somewhat disappointing.

DAISY BELL GOLD & COPPER DEVELOPMENT CO. MONTANA

Office: 91 Owsley Block, Butte, Mont. Mine P. O.: Renova, Jefferson Co., Mont. Dr. Renish, pres.; Malcolm Gillis, vice-pres.; W. E. Carroll, sec.; J. H. Dickson, treas. and gen. mgr. Capitalization \$600,000, shares \$1 par, nonassessable; 200,000 in treasury. Lands, 3 claims, in Bone Basin mining district, Madison county, Mont., 2 miles southeast of Renova. Has a 160' shaft and 450' underground workings, showing ore giving assays up to \$350 gold per ton, with fair copper and silver values, with indications of increasing copper values at depth. The ore occurs as oxide, copper glance and native copper in fissure veins in schist near porphyry contact. Mine has 4 buildings, including blacksmith shop and boarding house. Property, 2 miles from the Northern Pacific railroad, is considered promising with the making of a small mine.

DAKIN MINE.**CALIFORNIA**

Now patented under title of Gray Eagle mine, located near Ft. Jones, at Happy camp, Siskiyou Co., Cal. Is being worked and opened by an adit tunnel and drifts, said to show some good ore.

DAKOTA CALUMET CO.**SOUTH DAKOTA**

Succeeded by Continental Copper Mining & Smelting Co., which went into receiver's hands, 1913 and has been reorganized as the Dakota Continental Copper Co. Property described under latter title.

DAKOTA CONTINENTAL COPPER CO.**SOUTH DAKOTA**

Company is a reorganization of the Continental Copper Mining & Smelting Co. Mine near Sheridan, Pennington Co., S. D., in the Black Hills, known as the Dakota-Calumet, or Lilian, with 52 claims, patented, 179 acres, showing quartz schist cut by igneous dikes and having veins traceable one-half mile. Veins show copper ore said to average 7% with low values in gold and silver. Development by an 825' shaft and 1,170' crosscut tunnel and 9 drift tunnels. Equipment includes 300-h. p. steam plant, with hoist good for 1,200', 7-drill compressor, all necessary shops and an old smelter of no present value. New company plans sinking shaft and developing mine at depth,

DAKOTA HEIGHTS CO.

Absorbed by Naumkeag Copper Co., 1912.

DALTON & LARK GOLD, SILVER & LEAD M. & M. CO.

UTAH

Dissolved by order of court, 1911. Bingham Consolidated Mining & Smelting Co. owns most of the claims of this company.

DALY JUDGE MINING CO.

UTAH

Office: 1022 Kearns Bldg., Salt Lake City, Utah. Mine P. O.: Park City, Summit Co., Utah. H. Otto Hanke, pres.; M. C. Fox, vice-pres.; G. M. Lambourne, sec.-treas. and mgr.; W. M. Bradley and A. C. Wall, directors. R. T. Mason, gen. supt.; Geo. D. Blood, cons. engr. Capitalization \$300,000, shares \$1 par. Company has valuable holdings in Park City district, adjacent to the Daly West mine. It is a large producer of silver-lead ores with much zinc and a small amount of copper, the average value of the shipping ore for the year 1912 being 34.8 oz. silver, 0.045 oz. gold, 19.7% lead, 19.9% zinc, 11.3% iron and 1.75% copper per ton, with a total value of \$30.23 per ton. The concentrates amounted to 13,419 tons and carried 1.6% copper with approximately the same contents as the shipping ore and a sale value of \$35.09. The output since incorporation has been 1,720,411 lbs. copper, of which 513,646 lbs. was made in 1912.

Development for first 6 months of 1913 was 9,000', being mostly towards the Bonanza Flat section from the 500' to the 2,300' level. Production for the first 6 months in 1913 was 25,514 tons concentrating and 2,155 tons shipping ore; monthly earnings, \$15,484 and available balance, July 1, 1913, \$527,385; average mining costs, \$3.46, and average milling costs, 72 cts.

Property is a regular dividend payer and the unexplored portion of the mine is promising.

DALY MINES CO.

ARIZONA

Idle. Office: 534 Byrne Bldg., Los Angeles, Cal. Mine office: Bouse, Yuma Co., Ariz. Carroll J. Daly, pres.; Henry F. Daly, vice-pres.; Jos. A. McBride, sec.-treas.; preceding officers, E. C. Daly and J. H. Clancy, directors; Ernest A. Haggott, engr. Organized March, 1909, under laws of Arizona, capitalization \$1,000,000, shares \$1 par, nonassessable; issued, \$438,700. Annual meeting, first Monday in March.

Lands, 16 claims, unpatented, area 270 acres, known as the Vulcan group, adjoining the Mudersbach mine on the north and west, in the Plo-mosa district, 8 miles south of Bouse. Property carries 3 contact deposits, in pre-Cambrian limestone, near contacts of altered andesite. Property shows old workings, with opencuts and pits and shafts of 10 to 35', developing oxidized surface ores. One orebody has new shafts of 30', 50' and 100', with 400' workings, showing oxidized copper ores and chalcopyrite, estimated by management to average 3% copper, 2 oz. silver and \$1 gold per ton. The Vulcan No. 2 claim has a 50' shaft, and a 100' iron gossan, traceable 900', carrying disseminated copper carbonates at several points.

DALY WEST MINING CO.

UTAH

Office: 163 South Main St., Salt Lake City, Utah. Mine office: Park City, Summit Co., Utah. J. Ernest Bamberger, pres.; H. G. McMillan, vice-pres. and gen. mgr.; Herbert S. Cohen, sec.; W. S. McCornick, treas.; preceding officers, Frank J. Hagenbarth and John Dern, directors; P. L. Williams, Jr., gen. supt.; Edw. L. Talbot, mine supt.; Frederick W. Sherman, mill supt.; F. I. Williams, engr.

Organized Feb. 14, 1902, under laws of Colorado, capitalization \$3,600,000, shares \$20 par, and has been once reconstructed. Owns a 20% stock interest in the Little Bell Mining Co., an adjoining property. Corporation Trust Co., New York, North American Trust Co., New York, and McCornick & Co., Salt Lake City, registrars; American Loan & Trust Co., Bos-

ton; North American Trust Co., New York, and McCornick & Co., transfer agents.

Company is a large silver-lead producer, copper being a by-product, though the annual production is about 800,000 lbs.

The gross income to the end of 1912 totals \$15,058,185, out of which 44%, or \$6,579,000, has been paid in dividends. Net earnings for 1911 were \$278,259 and for 1912, \$134,883. Dividends have been 30 cts. quarterly in recent years, reduced to 15 cts. in 1913. Company's report for year ending Dec. 31, 1912, shows ore sales of \$587,961 and dividends paid, \$216,000, as against ore sales of \$821,689 in 1911; cash on hand, \$109,869. During the year company purchased new ground for \$117,734.

Copper production since 1898 aggregates about 16,000,000 lbs., being 521,273 lbs. in 1909; 574,506 lbs. in 1910; 877,414 lbs. in 1911 and 711,694 lbs. in 1912.

Property consists of the Daly West and Quincy mines with 50 claims, patented, area 250 acres, in the Uintah district. Extensive orebodies carry gold and silver-bearing chalcopryrite, galena and sphalerite, with silicious gangue, values being mainly in silver and lead, with small copper values, and still smaller gold values. Ores are declining in value with depth. Production formerly equally divided between smelting and concentrating ore, is now mainly the latter. The property has 3 principal veins, of 4 to 6' minimum and up to 40' maximum width. Upper workings are practically worked out, lower workings show concentrating ore. The main shaft is 2,200' deep, and the mine has about 15 miles of workings, an average of nearly 1 mile of new ground being opened yearly. Connection was made, Oct., 1909, with the 3-mile Ontario drainage tunnel, on the 2,100' level, for the use of which company pays \$750 monthly rental.

Ore mined in 1911 came mostly from the 1,700 to 1,900' levels, the average value being \$9.28 per ton. In 1912, the ore milled averaged 5.5% lead, 8 oz. silver, 5.2% zinc, 3.9% iron, 70.4% silica. The copper in the lead concentrates averaged 1.1%. Development for 1912, mainly on 1,550', 1,700' and 2,100' levels. Development for 1913 will be nearly double that of former years, being done by contract with MacIlwee interests of Colorado.

The 30-ton concentrator has crushers, rolls, automatic sorting belt, two 5' Huntington mills, and Wilfley tables, putting about 6 tons into 1, with an average extraction of 98% lead and 70.5% silver, the practice being exceptionally advanced and successful. The management will build a new mill if development work, 1913, proves up ore in the lower levels sufficient to warrant it.

The tailings mill, 56x82' in size, 400' northeast of the concentrator, has a 5' Huntington mill for regrinding, two 2-compartment jigs, 6 concentrating tables, 1 Wilfley table and 7 slime, settling and classifying tanks, treating tailings at a cost of about 20 cts. per ton, when in operation. Water supply for both mills is secured, under contract, from the Daly-Judge mine.

Costs for 1912, producing 55,850 tons from 1,700 to 2,100' levels, were: \$6.05 per ton for mining, including 7,131' exploration and development at \$17.60 per foot; general expenses, \$0.547 per ton; ore sorting, \$0.026 per ton, or 85 cts. per ton for 1,369 tons of waste; milling cost, \$1.45 per ton of ore fed.

Property, though an old one, has much new territory yet to be prospected and the known ore shoots give indications of going to greater depths.

DAN CREEK GOLD & COPPER CO.

ALASKA

Letters neither answered or returned from 1143 Sixteenth Ave. North.

Seattle, Wash. Mine office: Nizina, Copper River district, Alaska. J. W. Range, pres.; John F. Jury, sec., at last accounts. Organized 1907, under laws of Washington, capitalization \$1,000,000. Lands, 28 claims, 1 fractional, area 550 acres, with 6 placer claims, area 560 acres, and two 5-acre mill sites, on Dan and Copper creeks and Nikolai gulch. Lands, known as the Rosebud group of 11 claims, show a vein of 2 to 10' width, carrying hornite and chalcopryite ore, and 16 other claims elsewhere along Dan creek, 9 miles from Nizina and about 8 miles east of the Bonanza mine.

DANA COPPER CO.

MICHIGAN

Absorbed, 1912, by the Calumet & Hecla Mining Co., and corporate existence terminated. Lands, 640 acres, being the E. $\frac{1}{2}$ of Sec. 25, T. 58 N., R. 31 W., bounded on the north by Arnold and on the other 3 sides by the Central, in Keweenaw county, Mich. Mine, opened 1851, never was a producer, and has been idle since 1857.

DANE MINING CO.

ONTARIO

P. O.: Dane Station, Lebel township, Ontario. Alexander McKinnon, sec.-treas.; G. O. McMurtry, mgr.; Alex. D. McPhe, supt. Property consists of 1,200 acres in northwest corner of Teck township. Has 2 orebodies, 1 with quartz gangue, the other massive chalcopryite. A shipment of 60 tons of 15% ore, from No. 4 vein was made, Sept., 1913. Manager estimates reserves at 116,600 tons with $3\frac{1}{2}\%$ copper content. Developed by 2 shafts to depth of 200'. Diamond drilling was contracted for and will prove up the property. Reported to be preparing to build a 100-ton concentrator March, 1913. Owing to long haul to railroad and high freight rates, company cannot expect to become an important producer until development proves up a large tonnage, since ore in bottom of shaft No. 2 is low-grade.

DANES LEA MINING CO.

CALIFORNIA

Letters neither returned nor answered from Encinitas, San Diego Co., Cal. See Vol. X.

DARBY MINING & MILLING CO., LTD.

MONTANA

Letters neither returned nor answered from Mullan, Idaho. Mine near Superior, Missoula Co., Mont. C. A. Pooley, pres.; M. J. McHugh, sec.; preceding officers, Jas. A. Bean, S. C. Bean and Jas. Gormley, directors, at last accounts. Lands, $3\frac{1}{2}$ miles north of Spring gulch, in the Carter camp, have 2 tunnels, lower 720', and a 50' incline shaft, on a 5' vein carrying a little copper and galena, assaying 5 to 7% lead, with good silver values.

DARGIN & RICHARDSON.

MEXICO

Former owners Santa Edubijis mine, Union de Tula, Autlan, Jalisco, Mex.

DAVIS-DALY COPPER CO.

MONTANA

Office: 79 Milk St., Boston, Mass. Mine: Butte, Mont. H. M. Burton, pres.; F. A. Schirmer, vice-pres.; Charles G. Schirmer, sec.-treas.; Wm. Bloom, asst. treas., and Gen. Hugh Bancroft, directors; W. L. Creden, gen. mgr.; Wm. Frazier, mine supt. First National Bank, Boston, transfer agent; Federal Trust Co., Boston, auditors. Organized Sept. 14, 1908, under laws of Maine, as successor of Davis-Daly Estates Copper Co., capitalization \$6,700,000, shares \$10 par, assessable; issued, \$6,000,000; paid \$9. For the earlier chapters in the history of the company, readers are referred to description of the Davis-Daly Estates Copper Co. in Vol. VIII and to a spicy account by Stevens in Vol. X of the Copper Handbook. The present directorate is in no way responsible for the company's past and appears likely to make the property a successful one.

Income and expense account for 1912 was: Balance working capital, 1911, \$346,147; additional income accrued (ore sales \$104,600), \$113,329; de-

duct cost of development and expenses (Colorado mine, \$193,450; Silver King mine, \$500,578); total, \$199,029, general expenses, Butte office, \$19,291; New York \$8,721, Boston office \$1,707; legal and accident costs, \$11,918; total, \$240,667; deficit for year, \$127,338.

General balance sheets up to June 30, as follows: Mining property—1909, \$4,186,877; 1910, \$4,135,476; 1911, \$4,129,051; 1912, \$4,125,620. Equipment—1909, \$79,323; 1910, \$108,309; 1911, \$114,789; 1912, \$125,683. Development—1910, \$644,653; 1911, \$844,639; 1912, \$971,978. Stockholders' liability—1909, \$1,800,000; 1910, \$1,200,000; 1911 and 1912, the same. Current assets—1909, \$46,020; 1910, \$21,003; 1911, \$95,444; 1912, \$70,371. Cash on hand—1909, \$291,106; 1910, \$83,759; 1911, \$250,703; 1912, \$143,873. Liabilities—Capital stock, 600,000 shares, \$8 per share paid and uncalled for subscription of \$2; total, \$600,000. Taxes, accounts payable and wages payable—1909, \$41,252; 1910, \$157,248; 1911, \$18,579; 1912, \$20,513.

In April, 1911, a change in the directorate was made and in October Mr. Heinze was deposed as president and New England interests became dominant. Under the new control, the money loaned to the Ohio Copper Co. was collected with interest at 6% and a \$5,000 bonus. Also the money invested in the Porcupine property was returned to the company with a stock bonus. Immediately after assuming control, the new board of directors had an independent examination of the property made by W. H. Wiley and a new manager was appointed to carry out Mr. Wiley's recommendations. The result was favorable and the property placed upon a shipping basis of 50 tons a day, although the large amount of development prevented profitable operations.

After a year's operations, Mr. W. B. Fisher resigned as manager and was succeeded by Mr. W. L. Creden, whose development, carefully planned from geological studies, opened up an exceedingly valuable orebody, so that in May, 1913, the company for the first time in its history, made an operating profit of about \$6,000, shipping 200 tons daily. This development indicates a continuance of this satisfactory condition for at least another year.

Property consists of a small surface area and of the mineral rights of 320 acres under the city of Butte, adjacent to, but south and west, of the known productive area. The development consists of the Colorado shaft, 2,035' deep, with about 20,000' of drifts and crosscuts. The chief workings are on the 1,000', 1,200', 1,400', 1,500', 1,700' and 1,900' levels. Two main veins have been developed, running in northwest-southeast direction corresponding to the Blue Vein system to which the Jessie, Edith May and other very productive fault veins belong. There are also several east and west veins on which but a small amount of development has been done until recently. The first ore developed was on the "Fisher stopes" on the 1,400' level, 350' west of the Colorado shaft, showing an orebody 400' long, 7½' thick and 100' high, averaging 2.9% copper and 5.6 oz. silver per ton. The same vein has been extensively developed down to the 1,700' level, development in July, 1913, showing 7' of 4% copper.

The veins are frequently faulted and a careful study of geological conditions is necessary to successful recovery of veins beyond the faults. During 1912, considerable development work on the 1,400' and 1,700' levels and some diamond drilling, failed to disclose any new orebodies. The shaft was sunk to its present depth in that year and new crosscuts showed ore in several small fault veins, barren on the 1,700' level. In 1913, the new manager drove a crosscut 85' south from the old Heinze workings on the 1,400' level and encountered a 12' vein of high-grade ore beneath the Hesperus claim. Drifting on this, the Hesperus vein, together with crosscuts

at other points, has proven an orebody 12 to 14' wide, averaging 4.43% copper and 7 oz. silver per ton, for 325' in length. As both faces are still in ore and the company owns about 2,200' along the vein, there is a prospect of a very large orebody being opened up. The same orebody is now being developed on the 1,200', 1,500', 1,700' and 1,900' levels. On the 1,900' level, a 3' vein carrying 2' of 50% ore was also found far distant from any other vein. This has proven to be persistent and likely to prove a source of much high-grade ore.

The Hesperus orebody and old stopes on the 600' and 1,200' levels are maintaining a production of 300 tons of ore daily, July, 1913.

The Western half of the property is practically undeveloped. A long crosscut from the Original mine explored the ground, but failed to develop commercial ore. Upon the Silver King claim, 2,500' northwest of the Colorado shaft, the Sutton shaft, 310' deep, developed ore: shipments of 489 tons carried 3% copper, 2½ oz. silver and 86 cts. gold. As this western half of the property was entirely undeveloped, an arrangement was made with the Anaconda Co. to drive a crosscut south from the West Gagnon mine at a depth of 1,900'. It is expected to cut the Silver King vein, 1,000' from the Gagnon.

Besides the 2 shafts already mentioned, there are several old openings on the company property. The Smokehouse shaft, across the street and south of the Thornton hotel, is 700' deep and lost the vein on the 500' level. The Mount Moriah mine has a 640' three-compartment shaft and the ground is explored by a crosscut 2,000' long from the 1,800' level of the Original mine. When seen by the writer, the veins cut in this crosscut showed no payable ore, but not a foot of drifting had been done to disclose conditions along the strike of these veins. There are various other shallow workings on the property held by this company, which it must be remembered, is a tract 1¼ miles long by one-half mile wide. These old workings yielded considerably over \$1,000,000, principally in silver from the enriched surface ore.

Equipment is quite extensive and includes electric-driven air compressor, a fine hoist and a large battery of boilers ready for action, in case electricity is cut off. The ground around the shaft being limited, the output at the mine is conveyed several blocks over a narrow-gauge surface tram to the ore bins alongside the Northern Pacific railroad. For the year ending June, 1912, company mined 16,823 tons, realizing \$7 per ton, costing \$3.63 to mine, development \$2.44 and fixed charges of \$4.34. It is at present spending at the rate of about \$1,000 daily and making a profit of about \$300 daily, shipments now averaging 300 tons daily.

The Davis-Daly ground has been generally considered to contain only low-grade and base, zinc-pyrite ores and to be outside the copper section of Butte camp. Recent developments indicate, however, that good copper ores and large orebodies exist and that the extensive area of unexplored ground may make this property a profitable one. Management good and company affairs now handled by men who it is believed will endeavor to make the property a dividend payer and not a stock gamble.

DAY BRISTOL CONSOLIDATED MINES CO.

NEVADA

Office: 80 Broadway, New York. Mine office: Pioche, Lincoln Co., Nev. H. F. Widdicombe, gen. mgr.; Wm. Tullock, supt.; Thos. Tullock, asst. supt.; M. M. O'Boyle, pres. Capitalization \$10,000,000, shares \$10 par; issued, \$6,000,000. Company is a consolidation of the Hillside Copper Co. and the Bristol Consolidated Mines & Smelting Co., which owns the Bristol Copper Co. and is itself owned by the California-Nevada Copper Co.; \$3,000,000 more was paid to the Nevada Utah Co. for its Day mine. Com-

pany is now a subsidiary of the Nevada-Utah Corporation, organized 1913.

Property includes the May Day mine and the Gypsy, Vesuvius, National, Inman, Tempest, Oregon Short Line, Iron and Day mines. The Day mine comprises 5 claims on the opposite side of the mountain and was needed in order to drive a tunnel through the mountain, giving direct access to the railroad.

Mines, opened in 1880, produced about \$500,000 worth of ore with values mainly in silver, ores changing at depth to copper. Developed by the 300' Iron shaft, 700' Gypsy and 500' May Day shafts, with 7 or 8 other old shafts, with about 2 miles of workings. The Gypsy mine shows good ore on the 300', 400' and 450' levels, opened in 1913 and 500' level was being driven to cut same orebody in April. Ore is a mixed sulphide carrying lead, copper and silver.

Equipment includes a 50-h. p. steam plant, with 12-h. p. and 20-h. p. hoists, a 2-drill Durkee air compressor, and an electric light plant.

Mine has been shipping about 100 tons daily of silver-copper ore to the Garfield smelter, the Gypsy mine furnishing 50 tons, the Iron mine 20, and the May Day mine the balance. The production from the Day mine for 1911 was 420 carloads, this ore being taken out from above the 900' level and being mostly a silver manganese ore, whereas the ore from the Bristol group is a silver-copper ore.

DEATH VALLEY COPPER GLANCE MINING CO. CALIFORNIA

Mine near Greenwater, Inyo Co., Cal. Probably dead. See Vol. X.

DEATH VALLEY COPPER MINES & SM. CO. CALIFORNIA

Letters unclaimed at Greenwater, Inyo Co., Cal. Probably dead. Described Vol. X.

DE BORGIA COPPER MINING CO. MONTANA

Letters neither returned nor answered from Mullan, Idaho, or mine office: De Borgia, Missoula Co., Mont. Lands, on Goat mountain, show a 6' fissure vein carrying argentiferous cuprite, melaconite and bornite, with quartz gangue. Development is by a 320' shaft and 2 tunnels, upper 350', with back of 350', lower having a 400' back. Idle.

DECATUR COPPER MINING CO. ARIZONA

Letter unclaimed at Jerome, Yavapai Co., Ariz. Idle since 1904, and probably dead. Described Vol. X.

DECKER CANYON MINING CO. UTAH

Letters neither answered nor returned from Provo, Utah. Mine near Heber, Wasatch Co., Utah. Jesse Buckner, pres.; John E. Peay, vice-pres.; P. P. Hindmarsh, sec.-treas. at last accounts. Organized March, 1909, under laws of Utah, capitalization \$50,000, shares 5 cts. par, assessable. Stock is listed on the Salt Lake exchange. Lands, 12 claims, unpatented, in Decker canyon, south of the Mountain Lake mine, 3 miles from Heber, having a 75' shaft and 1,100' of tunnels, showing argentiferous and auriferous lead and copper ores, in small quantities. Idle.

DECORAH MINE. IDAHO

Owned by Seven Devils Copper Co. at Landore, Washington Co., Idaho.

DEEP CREEK CONSOLIDATED MINING CO. UTAH

Office: Provo, Utah, care Andrew J. Allen, sec.-treas. Mine in Deep Creek district. Harvey Cluff, pres.; Mrs. Elon L. Allen, vice-pres. Incorporated 1913, under laws of Utah, capitalization \$10,000. Lands contain extension of Gold Hill vein, Deep Creek section, and ore contains copper, lead and silver.

DEEP RIVER GOLD MINING CO. NORTH CAROLINA

Mine near High Point, Guilford Co., N. C. Opened many years ago,

said to show gold and silver-bearing copper ore. No trace of recent operations secured.

DEER CREEK DEVELOPMENT CO.

UTAH

Address: John Cleghorn, pres., room 625, Boston Bldg., Salt Lake City, Utah. Mine at American Fork, Utah Co., Utah. Organized 1903, capitalization \$125,000, shares 25 cts. par. Property, 7 claims, in the Deer Creek district, showing a fissure vein in granite of 3 to 6' width, carrying ores assaying up to 22% copper and 7 oz. silver per ton. Mine closed down in 1910 and present status of company unknown.

DEER CREEK MINING & MILLING CO.

IDAHO

Office: Forest, Lewis Co., Idaho. W. J. Orr, gen. mgr. Property, 17 miles southwest of Winchester, in the Salmon River district, shows ore-bodies 10 to 20' wide carrying copper ore with gold values. One vein has 4' of chalcopryite ore developed by a tunnel; \$150,000 reported to have been spent in development and equipment, latter including 2,000' of flume, water wheel and compressor. Company plans 1,500' tunnel to tap vein at 1,000' and the erection of a concentrator.

DEERFLY MINING CO.

WASHINGTON

John B. Davidson, superintendent, Lucerne, Chelan Co., Wash. Property shows fissure veins carrying copper and lead ores. Developed by tunnels. Company operating intermittently for several years.

DEER TRACK COPPER CO.

ARIZONA

At Mayer, Yavapai Co., Ariz. Idle and no trace of operations secured.

DEERLODGE CONSOLIDATED MINES, LTD.

MONTANA

Was liquidated, voluntarily, 1910. Formerly at Anaconda, Deer Lodge Co., Mont. Described Vol. VIII.

DEL MONTE CONS. MINING & REFINING CO.

NEVADA

Situated 6 miles west of Luning, Mineral Co., Nev. Consists of Lake View and other claims, covering the Julia "ore belt." On the Lake View, a shaft 100' deep is reported as having disclosed ore assaying 8% copper, \$2 gold and 8 oz. silver per ton in a fissure vein lying between limestone and porphyry. The Julia "ore belt" has been developed to depth of 200' and 1,000 tons of silver-gold ore carrying lead has been shipped. Company said to be planning an addition to its mill to cyanide the ores.

DEL VERDE TUNNEL CO.

UTAH

Office of mine: 2411 Washington Ave., Ogden, Weber Co., Utah. Francis L. Woods, vice-pres. and gen. mgr.; C. H. Hussey, sec.-treas.; preceding officers, M. S. Poulter, B. F. Critchlow, W. L. Porter and Jas. A. Bingham, directors. Organized Jan., 1908, capitalization \$200,000, shares 10 cts. par, assessable, with assessments limited to one-half cent yearly. Is a merger of the Utah Buckhorn Mining Co. and Weber County Mining & Milling Co.

Property consists of 1 claim, patented, 20 acres and a 5-acre mill site in Weber mining district, on which silver-bearing copper sulphides occur in a contact deposit between lime and quartzite running north 20° west and dipping at 55°. Mine, 1 mile from Ogden Rapid Transit Street railway and from Oregon Short Line.

Developed by 425' tunnel, showing 2 orebodies, 6 to 20' wide, said to carry 2% copper, 2 oz. silver and 40 cts. gold per ton. Deposit discovered 1869, worked 1870-72, reopened 1907 and idle since 1908. May do some work this year.

DELANO MINE

NEVADA

At Contact, Elko Co., Nev. Owned by Seattle Contact Mining Co., which see.

DELAWARE MINE.

Owned by Manitou Mining Co., Keweenaw Co., Mich. Allouez conglomerate was worked, but was too lean for profit.

DELTA CONSOLIDATED MINING CO.**CALIFORNIA**

Office: Redding, Shasta Co., Cal. Mine on Dog creek, near Delta, Cal. Dr. Sherman T. White, pres.; S. D. Furber, sec. Company owns the Preacher mine and has built a narrow-gauge railway connecting with the Southern Pacific tracks at Delta. Ships fluxing ores to Mammoth smelter at Kennett.

DELUSION MINE.**NEW MEXICO**

In the Jarilla Mountain district, Otero Co., N. M., west of the Lucky and By-Chance mines. Messrs. James Parker, of El Paso, Texas, and Armstrong, of Parral, owners. Property opened up in Aug., 1913, and said to be shipping copper-gold ore to the El Paso smelter. Ore is similar to that in the By-Chance mine, carrying chalcopyrite and pyrite in gold.

DE MIER COPPER CO.**NEW MEXICO**

Letters neither returned nor answered. Mine near Alamogordo, Otero Co., N. M. John R. De Mier, pres.; O. G. Cady, vice-pres.; E. D. McKinley, sec.-treas. Organized Aug. 4, 1910, under laws of New Mexico, capitalization \$600,000, shares \$1 par, nonassessable.

DEMOCRATA CANANEA SONORA COPPER CO.**MEXICO**

Office: Fourth National Bank Bldg., Cincinnati, Ohio. Mine at Cananea, Sonora, Mex. H. H. Hoffman, pres. and treas.; C. E. Hoffman, vice-pres. and gen. mgr.; Herbert H. Hoffman, sec.; W. B. Hughes, mine supt.; J. J. Williams, smelter supt.; H. S. McKay, mg. engr.; Ray Wolf, purch. agt. Organized May 8, 1905, under laws of Arizona, capitalization \$3,000,000, shares \$10 par; issued \$2,800,000. Bonds authorized \$271,000, but none issued. Central Trust Co., registrar. Annual meeting, last Tuesday in May.

Property, 18 hectares, 44.5 acres, lying between the Capote and Veta Grande, in the heart of the Greene Cananea mines. Orebody is of contact metamorphic origin, consisting of a breccia of fragments of altered limestone, cemented by quartz, bornite and copper pyrite, in a fracture zone 50' wide in limestone. The orebody lies about 300' north of the Democrata shaft and also outcrops in 2 patches of garnet rock surrounded by diorite porphyry, good carbonates being mined at the surface.

Development comprises a 500' shaft and 2,200' tunnel, with 2 other shafts of 90' and 180', together with 3 tunnels of 300', 110' and 60', aggregating 4 miles of underground workings. Recent exploration has shown a new orebody on the 200' level, giving 7½% copper and 5 oz. silver for a width of 40' with a face still in ore. On the 500' level, the known orebody is proven to be larger than previously estimated and the stopes are yielding 8% ore. The East orebody near the Kirk mine, developed by tunnel workings, has also materially increased the proven ore reserves.

Equipment includes new electrically-operated hoist and air compressor, power being obtained from the Cananea Consolidated Copper Co.

Smelter contains 2 blast furnaces of 150 and 300 tons daily capacity, making 33% matte, sold to the local market.

Property was closed down Sept. 1, 1907, to Sept., 1912, since which time the mine operations have been interrupted by a strike and the stoppage of rail communication for several weeks as a result of fighting between the Sonora state troops and the Federal soldiers, but smelter and mine have been running continuously since traffic was reopened in April, 1913.

Ore reserves at beginning of the year were estimated at 300,000 tons, averaging 4½% copper, 3 oz. silver and 25 cts. gold per ton. Production,

1912, 1,102,000 lbs. fine copper, 36,000 oz. silver and \$6,000 in gold for 4 months' operations. Property is a valuable one.

DENN-ARIZONA COPPER CO.

ARIZONA

Office: Sellwood Bldg., Duluth, Minn. Mine office: Bisbee, Cochise Co., Ariz. Martin Pattison, pres.; Lemuel C. Shattuck, treas.; Byron M. Pattison, Thos. Bardon, Archibald M. Chisholm and Maurice Denn, directors; John G. Williams, sec. Organized Jan. 14, 1907, under laws of Minnesota, as successor of Denn-Arizona Development Co., capitalization \$3,-500,000, shares \$10 par fully issued.

Lands, 13 claims, patented, area 200 acres, immediately east of the Junction shaft of the Superior & Pittsburgh. The Dividend fault traverses the company's ground for about 4,000', and big orebodies have been found on adjoining properties near this fault. Mine has a 1,600' shaft, started in conglomerate but penetrating limestone at 840', with upwards of a mile of workings. The 1,000' and 1,100' levels show considerable leached ore, with little commercial ore, though carrying occasional small bodies of rich cuprite. The 1,250' and 1,350' levels also show large areas of leached ore, with some low-grade sulphides on the 1,250' level, and a little native copper on the 1,350' level. The lower level has a little ore of 12 to 15% copper tenor. Management estimates the average tenor of ore developed, almost exclusively oxides and carbonates, at 8% copper. Apparently some good orebodies may be developed at 1,800' or deeper, though the ore is erratic. Work was resumed March, 1909, after nearly 18 months idleness, but the pumps were pulled Dec., 1910, and mine again rendered idle. The mine is wet, and has two 1,000-gal triple-expansion pumps on the 1,000' level, and five 800-gal. sinking pumps. Some diamond drilling was done, 1908, from the 1,100' level, apparently with negative results.

Equipment includes a 1,600-h. p. steam plant, with 6-drill and 25-drill Sullivan air compressors, and an 18x36" Ottumwa Corliss first-motion hoist, raising double-deck cages. Buildings include an 18x24' carpenter shop, 18x24' smithy and several other structures. There is a railroad spur to the mine.

Production, 1909, was 99,222 lbs. fine copper and 41 oz. gold.

Development work was energetically carried on despite very heavy pumping expenses until 1912, when an unusual influx swamped the pumps and the mine was shut down.

The Denn has an excellent chance of making a big mine, the claims covering an extension of the big ore zone of the camp, but the ore horizon at this point is lower than on the other properties. The deep development of the Junction, C. & A. and Saginaw properties will drain this ground as well as prove it, and further exploration will be easily and cheaply done. There is strong probability that this company and the Shattuck will be merged at some future time. Property is a splendid prospect. It may be several years before it makes a mine, but eventually, we believe, will be a valuable one.

DENNEMORA GOLD & COPPER MINING CO., LTD. MONTANA

Is a dormant corporation owning 6 lead-copper claims, one-half mile from N. P. R. R., near Taft, Missoula county, Mont. Described Vol. X.

DENNY DULIN GOLD & SILVER MINING CO.

NEVADA

Office: 223 Mohawk Block, Spokane, Wash. Fred N. Davis, pres.; A. E. Grant, vice-pres.; Thos. R. L. Harris, sec.; A. B. Railton, treas.; preceding officers and E. D. Doan, directors. Organized Nov., 1910, capitalization \$1,500,000, shares \$1 par, assessable; 18 assessments already called. T. R. L. Harris, transfer agent and auditor.

Lands, 5 claims, 100 acres, unpatented, in Morning Star mining district,

Nevada. Ore occurs in fissure veins in rhyolite, traversed by numerous porphyry dikes; vein runs east and west, dip 55° north, average width 4', proven depth 160', average assays, 12½% copper, 5 oz. silver, trace to \$12 gold per ton. Developed by shafts, 175' and 160' deep, and 150' tunnel. Company has let contract to continue shaft No. 2, 100', hoping to cut ledge dipping toward the shaft. Nearly 1 carload of ore blocked out.

DENVER SONORA MINING & MILLING CO.

MEXICO

Office: Denver, Colo. Mine in the Arizpe district, Sonora, Mex. E. J. Wilcox, pres.; H. W. Peebles, vice-pres.; F. W. Webber, sec.; C. H. Parker, treas., at last accounts. Organized 1907, under laws of Colorado, capitalization \$100,000, shares \$1 par, later increased to \$1,000,000.

Property consists of the Arremesia mine, with claims aggregating 40 acres on Aconche mountain, east of Ures. Development by 4 tunnels, 2 on each side of the mountain, reported to show orebody 23' wide, 300' long of commercial value. Total development, 800'.

DESCUBRIDORA: COMPAÑÍA MINERA y FUNDIDORA. MEXICO

Is the Mexican incorporation of the Descubridora Mining & Smelting Co.

DESCUBRIDORA MINING & SMELTING CO.

MEXICO

Office: 17 Battery Place, New York. Mine office: Conejos, Mapimi, Durango, Mex. H. L. Albridge, gen. mgr.; D. Gough, supt. Property is the Mina Descubridora, an antigua, carrying large quantities of very low-grade basic silver-copper carbonates, requiring silicious ore for fluxes not produced by the company's mines. Mine has a 500' shaft. Equipment includes steam and electric power. A former 600-ton smelter was dismantled, and equipment sold. Property was leased for several years, until 1908, to the Guggenheim Exploration Co. Forces are about 75 men, and ore is sent to the Torreón smelter. Production was 4,964,272 lbs. fine copper in 1903, but thereafter became much smaller, and production, 1909, is estimated at 750,000 lbs. fine copper.

DESERET ISLAND MINING CO.

UTAH

Idle. Office: Deseret National Bank Bldg., Salt Lake City, Utah. Mine office: Wendover, Tooele Co., Utah. John C. Sharp, pres. and treas.; L. L. Larsen, vice-pres.; Oscar W. Moyle, sec., at last accounts. Organized 1907, under laws of Utah, capitalization \$25,000, shares 5 cts. par, assessable; issued, \$16,000. Lands, 5 claims, unpatented, 8 miles from Wendover, carrying argentiferous lead and copper ores. Mine, slightly developed, has several shallow shafts.

DESERT QUEEN COPPER MINING CO.

ARIZONA

Mine near Quartzite, Yuma Co., Ariz. Organized May, 1907, under laws of Arizona, capitalization \$1,000,000. Lands, 11 claims, in 2 groups, opened by crosscut tunnels, intersecting veins at 300 to 500' depth, with 600' of drifting on the orebodies. Has a 40-h. p. gasoline engine, air compressor and power drills. Mine has been under development since 1902. Ores have given smelter returns of 10% copper, 25 oz. silver and \$12 gold per ton. No returns secured, probably closed down.

DESERT QUEEN GOLD CO.

ARIZONA

Office: 451 Marquette Bldg., Chicago, Ill. Mr. Voigtman, pres.; W. P. Nelson, vice-pres.; Will Nelson, sec. Owns 11 claims, patented, in Plo-mosa mining district, Yuma Co., Ariz. Ores containing chalcopryrite, said to average 7% copper, 10 oz. silver and \$12 gold per ton, occur in shear zone between schist and quartzite. Developed by 1,700' tunnel with about 30,000 tons blocked out.

DETROIT & COLORADO MINING CO.

COLORADO

Address: care L. W. Partridge, gen. mgr., 327 Railway Exchange Bldg.,

Denver, Colo. Organized Nov. 10, 1903, under laws of Colorado, capitalization \$1,000,000, shares \$1 par, nonassessable. Properties consist of the Champion and Aletha groups, 5 claims, 4 patented, situated 1½ miles S. W. of Silverton, 9,700' elevation. Ore is a mixture of copper and iron sulphides with tetrahedrite, but Aletha ore is a silver-bearing galena with chalcopyrite. The Champion vein is a gold-silver quartz carrying copper pyrite. Ores are said to average 31 oz. silver, 4.5% copper and \$5 gold, with increasing values in gold as depth is attained. The main development is by tunnel, but extent of present development is not reported. Property now idle because of litigation.

DETROIT COPPER MINING CO. OF ARIZONA.

ARIZONA

Office: 99 John St., New York. Mine and works office: Morenci, Ariz. Employs about 1,000 men. Dr. Jas. Douglas, pres.; Cleveland H. Dodge, vice-pres.; Geo. Notman, sec.-treas.; A. T. Thomson, gen. mgr.; M. H. McLean, mine supt.; E. W. Honeyman, smelter supt. J. S. Schroeder, chief chemist; W. A. Staab, assayer; D. J. Kelly, chief electrician; Chas. Legrand, cons. mech. engr., and C. A. Austin, purch. agt., 99 John St., New York.

Organized under laws of Michigan, capitalization \$1,000,000, shares \$25 par. Is controlled, through ownership of entire stock issue, by Phelps, Dodge & Co., Inc. Net earnings in recent years have been as follows: \$543,456 in 1903; \$603,340 in 1904; \$532,684 in 1905; \$973,456 in 1906; \$814,874 in 1907; \$1,074,296 in 1908; \$1,153,269 in 1909; \$1,406,170 in 1912. Company ended 1912 with a surplus of \$2,763,138. Paid \$1,464,610 in dividends in 1912. Dividends, 1897-1909, of 3¼ to 110% yearly, aggregated \$4,817,500.

Lands are extensive, including the Ryerson, Arizona Central, Copper Mountain, Yankee, W. Yankee, Montezuma and Santa Rosa mines, at and near Morenci.

The purchase of the mining properties of the New England & Clifton Copper Co., Standard Consolidated Copper Co., Standard Copper Mines, and Clifton Copper Mines, Ltd., adds a large area of undeveloped, but promising mining ground. The mines of this company work varied types of copper deposits, all dependent upon and co-extensive with a big intrusive body of quartz porphyry and its dikes. The ores are chalcocite, chalcopyrite and pyrite with various oxidized products occurring either in altered limestones, or as fissure veins in the impregnated rocks adjacent to them, or in large masses of altered, impregnated, shattered porphyry. The geologic relations are fully treated in a monograph by Waldemar Lindgren, Prof. Paper 43, U. S. Geol. Surv., and in "Copper Mines of the World," page 287.

Ores are mainly sulphide with slight gold-silver values and high silica and alumina contents. The oxidized and limestone ores are still produced in small quantities but 98.8% of the ores mined consists of small particles of chalcocite, associated with chalcopyrite and pyrite, in a leached and whitened, decomposed porphyry, averaging 3.08% copper, or about 47.67 lbs. of fine copper recovered. The high-grade ore from fissure veins carries 6 to 18% copper.

Mine development is very extensive, with numerous shafts and long cross-country connections. The workings have thus far been shallow, 400' being for many years the greatest depth. In 1912, development on the 600 and 700' levels of the Yankee mine, north of the Yankee fault, opened up 194,939 tons of 2.36% ore and similar deep exploration in the Arizona Central mine upset previous ideas that ores would not go deeper. Extensive deep development is planned for 1913-14.

About 90.55% of the output, or 460,340 tons, is now mined by the slicing system, costing 81.6% of the square set and fill cost, which is necessarily

still used in some parts of the mine. Block caving is still cheaper, uses but little timber and costs but 54.8% of the square set and fill method, but like the Gopher and fill method which is slightly cheaper, can only be used where favorable conditions prevail. In 1912, 11,061 tons were mined by underhand and square set back fill method, costing 27% more than square set.

The economy of these methods is shown by a reduction of timber used from 17½' board measure per ton ore in 1906 to 12.8 in 1910 and 9.75 in 1912.

For several years past gas producers and gas engines have been used for practically all machinery except hoists and locomotives; this equipment is described, Vol. X. In 1912, it was decided to substitute steam for all purposes except the engines operating the blowers. The boilers from the pumping plant were installed and 2 large steam turbines will furnish power for the entire plant.

The 64x200' power house, of steel frame on concrete foundations, has three 100-h. p. Crossley gas engines driving blowers that are connected with the furnaces by a 300' blast main; a 500-h. p. air compressor furnishing converter blast, at 8 lbs. pressure only, and two 200-h. p. 250-volt electric generators furnishing current that is stepped up to 2,500 volts at the power house, and carried by 4 feed wires to a second set of transformers at the West Yankee mine, there stepped down to 250 volts, and distributed to the various mines. There also is a complete electric lighting plant.

The concentrator, designed by H. Kenyon Burch, has proved remarkably successful, running 95% of the time. It consists of two 650-ton units, is 166x240' in size, and cost about \$1,000,000. Equipment includes Chilean mills, 6 sets of 16x42" rolls, 28 revolving screens, 80 Frue vanners, 40 Wilfley tables, and Deister tables, the mill putting about 7 tons into 1.

In 1912, the mill treated a daily average of 1,442 tons, putting 7.1 tons into 1, with a saving of 76.12% of the assay values, tailings averaging 0.8% copper and concentrates assaying 16.69% in tenor, 1 ton of ore being concentrated with 511.2 gals. of water, which is a very reasonable figure. A pumping station 6 miles distant raises water from wells on the San Francisco river to a height of 600', whence it is fed by gravity to the mill, which uses about 4,400 gals. per minute, with a consumption of new water of only about 80 gals. per minute, new water being supplemented by clarified water from an ingenious and highly efficient settling system, designed by Mr. Hunt, that includes concrete tanks and settlers, a steel dam, and a pond for tailings. A 14,000' launder was built, 1909, along Chase Creek cañon, to convey tailings from the mill to impounding reservoirs on the slopes below the mouth of Morenci canyon. The tails form a solid compact mass almost as strong as cement and successfully solves the tailings problem.

The 100-ton sampling mill is connected with the concentrator by a 400' belt conveyor. Experiments with oil concentration did not lead to the adoption of that process.

The smelter has one 42x264" and four 54x144" blast furnaces, and a converter department. Flue dust is briquetted for resmelting. The smelter has 2,000-ton ore bins, surmounted by a steel railroad trestle.

In 1912, 160,649 tons were smelted, using 75,783 tons of ore and concentrate, 24,286 tons of limestone, 18,450 tons of coke and making an output of 24,802,789 lbs. of copper bullion with a saving of 93.86%. The coke consumption was 584 tons less than in 1911, though the charge was 9,596 tons larger.

A 36" gauge railway connects the mines and smelters with the Arizona & New Mexico railroad, at Guthrie, this line having a maximum grade of

3.5%, with 4 complete loops within an air-line distance of $1\frac{1}{2}$ miles, near Morenci. A tunnel through Longfellow hill, completed 1909, gives direct rail connection with the mill.

In 1912, taxes were increased from \$15,973 to \$58,490 and an increase in wages added 10 cts. per ton to cost of mining, while reduction of working hours under new state law from 8 to $7\frac{1}{2}$ cut quantity mined per man from 3.95 to 3.68 tons.

The company operates a large department store, and an excellent hotel, and maintains a library, gymnasium and club room for its 1,414 employees.

Production in 1912 was 519,632 tons of ore, producing 24,802,789 lbs. of copper bullion. The property is managed with great skill, in all departments, and is an exceptionally fine example of a successful low-grade mine.

The New England Clifton Copper Co. holdings now owned by the Detroit Company comprise 78 claims, area 1,006 acres, lying mainly near the Shannon, 5 miles northwest of Clifton, on the northern side of the San Francisco river, including the New England, Clifton, Antietam and Copper King mines. Development on former shows a fissure vein in granite of 5' width, with an ore shoot 400' in length, carrying silicious sulphide ores, with chalcocite, chalcopyrite and occasional oxides and carbonates, all slightly auriferous and argentiferous, said to average 12% copper to depth of 350', the ore shoot declining rapidly in grade below 350', running to silicious sulphides of about 2.5% copper on the tunnel level. Ore bunkers, about 2 miles below the mines, receiving ore by wagons and aerial tram, are connected with the Arizona railway by a 3-mile surface tramline.

Development at the New England mine includes 2 shafts, deepest 750', and a 2,000' tunnel. The Clifton mine has 7 shafts, of 70 to 315' depth, with tunnels of 220', 450', 700', 800', 1,000' and 1,700'.

The Antietam mine, of 3 claims, has a 2-compartment shaft, developing an orebody of 15 to 35' width, carrying chalcocite and chalcopyrite, giving assays of 4 to 10% copper, 1 to 7 oz. silver and \$2 gold per ton, and has been said to have about 40,000 tons of ore in sight.

The Copper King mine is as yet but slightly developed, but has been claimed to show about 40,000 tons of ore. An aerial tram from the Copper King mine was completed 1909.

Equipment includes steam, gasoline and electric power, with hoists, an air compressor, and a number of mine buildings.

DETROIT & LAKE SUPERIOR COPPER CO.

CONNECTICUT

Office and works: Waterbury, New Haven Co., Conn. Is a half owner of the stock of the Lake Superior Smelting Co., which bought the plants of the Detroit & Lake Superior Copper Co. at Hancock and Dollar Bay, Houghton Co., Mich. Built a smelter at Detroit, 1850, and shortly after built another at Hancock, being the pioneer in Michigan smelting.

DETROIT-OROVILLE EXPLORATION CO.

WASHINGTON

Office: 406 Gladwin Bldg., Detroit, Mich. Mine office: Oroville, Okanogan Co., Wash. F. A. Kelsey, pres.; Chas. E. Kanter, vice-pres.; Milton T. Watson, sec.-treas. Organized June 1, 1908, under laws of Michigan, with capitalization \$3,000, shares \$10 par. Lands, 15 claims, area 300 acres, with a smelter site, showing carboniferous limestone resting on graywacke slates, carry chalcopyrite ore giving assays up to 15% copper. Property has been partially explored by diamond drilling, last work, 3 holes, of about 1,000' aggregate depth, having been done, 1910. No returns secured. Probably idle.

DEVELOPMENT COMPANY OF AMERICA.

ARIZONA

Secretary's address: J. J. Wratgovich, 11 Pine St., New York. Reorganization committee: Room 1605, 111 Broadway, New York. Company's

affairs are in the hands of a bond and stockholders' committee. (See Vol. X for officers and organization.) Organized Nov. 23, 1901, in Delaware, as a holding company to finance and promote a group of mining enterprises in Arizona, controlling, through stock ownership, the Tombstone Consolidated Mines Co., Ltd., Imperial Copper Co., Congress Consolidated Mines Co., Ltd., and Poland Mining Co. Company also owned large stock interests in the Gila Copper Sulphide Co.; the Lookout Copper Co.; controlled the Southern Arizona Smelting Co. through Imperial Copper Co., and owned a large block of stock in the London-Arizona Copper Co. which company has a large interest in the London Range Copper Co. Company organized the Arizona, Mexico & Gulf of California Railroad Co., 1910, planning to build a railway from the Arizona Southern railway, which is owned by the Imperial Copper Co., a subsidiary, to Port Lobos on the Gulf of California, a distance of approximately 200 miles. The authorized bonds and stock of the Arizona, Mexico & Gulf of California Railroad Co. were never issued.

The Tombstone Co. owned, or controlled practically all the mines of Tombstone, Ariz., that once wonderful camp, whose mines were closed down in the 80's when a heavy influx of water drove the miners from the workings. The new company installed enormous pumps and for 7 years made a brave attempt to develop the properties, though the mines were never reopened to an extent permitting of thorough prospecting. The Development Co. supplied nearly \$2,500,000 to its Tombstone subsidiary in addition to funds realized by the Tombstone Co. from the sale of its special contract bonds, before it came to the end of its resources, when, with \$1,670,716 of its notes protested, the collateral security for these notes was sold at auction. The Tombstone expenses practically caused the downfall of the Development Co.

The most promising subsidiary of the Development Co. was the Imperial Copper Co., which worked out its high-grade smelting ores, and though possessed of a fine plant, railroad and model smelter (see Imperial Copper Co.) could not operate profitably when copper fell below 13 cts., because development work had not been carried sufficiently in advance of extraction.

This ambitious corporation which was for 10 years a big factor in the mining development of Arizona is now dead. The company controlled, either through entire or partial stock ownership, a number of famous mines in Arizona, though it was itself a holding corporation and operated only through its subsidiaries.

In 1911, the company being unable to meet the interest on its bonds, a bondholders' and stockholders' committee was formed and the securities behind these bonds were sold at public auction on April 17, 1913, and purchased by Wallace Fairbank, Frank M. Murphy and Thomas W. Synnott, acting as the committee of bondholders and stockholders of the company. The securities bought in included 250,000 shares of the Imperial Copper Co. and 400,000 shares of the Tombstone Consolidated Mining Co., Ltd. The stock of both companies is without value as they are bankrupt. The stock of the Poland Co. and \$1,211,340.91 certificates of indebtedness, control that company, and the Congress Co., having no bonded debt, is controlled by its stock.

On June 25, 1913, the committee issued a circular letter to the bondholders stating that \$28,500 was required to pay off taxes, labor liens, etc., and that maintenance on these two companies would cost about \$8,000 per year. As this property is all that is left to recoup the bondholders each one has been requested to loan, on a 7% promissory note, 2% of the face

of his bonds. In default of receiving \$40,000 in this manner the committee will have to find other means of meeting the situation or incur a total loss of the only assets remaining. The stock of the company is of course valueless.

DEVINE MINING CO., LTD.

WASHINGTON

Office: 704 New York Block, Seattle, Wash. Mine office: Cle Elum, Kittitas Co., Wash. C. P. Devine, pres. and gen. mgr.; F. A. Pontius, vice-pres.; Henry S. Noon, sec.; Wm. T. Kipp, treas.; Clancy M. Lewis, engr. Organized 1904, under laws of Washington, capitalization \$1,000,000, shares \$1 par. Annual meeting, second Monday in April.

Lands, 2 claims, area 40 acres, also two 5-acre mill sites and a water right, in the Gold Creek district, 12 miles north of the Northern Pacific railroad, claims showing andesite and rhyolite, with veins having lenticular shoots, of 45' estimated average width, carrying sulphide ores, reported to average 5% copper, 25 oz. silver and \$4 gold per ton, with traces of lead and zinc. Apparently values are mainly in a 40" footwall paystreak, balance of vein carrying concentrating ore of 2.5 to 5% copper tenor, with small gold and silver values. Development is by tunnels of 75', 125', 300', 320' and 800', the longest tunnel giving a back of about 700'. The mine had 1,520' of workings, 1908, estimated by company to show 100,000 tons of ore, with 50,000 tons blocked out for stoping. Inactive, 1912, but further development planned as soon as new capital is secured.

DICKEY COPPER CO.

ALASKA

P. O. address: Ellamar, Alaska. W. A. Dickey, mgr.; C. W. Harrington, supt. Property comprises the Dickey group, on Copper mountain, on the shores of Landlock bay, 4 miles southeast of Ellamar. Contains copper ore in lenses along shear zones, in greenstone. Shipments of 400 to 600 tons monthly of 12% ore were made to the Tacoma smelter in 1912. Company also has option on Mason-Gleason group, on Fidalgo bay and was developing on the property in 1912. The latter group shows high-grade ore, but nearest shipping point is Irish Cove, 3 miles distant.

DISPATCH MINING CO.

MEXICO

Owned by Bisbee-Sonora Development Co., which see.

DIVIDEND MINING & MILLING CO.

NEW MEXICO

Idle. Office: 65 Journal Bldg., Boston, Mass., at last reports. Mine office: Estey, Socorro Co., N. M. J. M. Bryson, pres. and gen. mgr.; J. E. Simpson, vice-pres.; B. F. Coburn, sec.-treas.; preceding officers, F. B. Street, J. Wm. Rice, Samuel Porter, A. B. Spear, Jas. B. Putnam and Halbert E. Parkhurst, directors; W. E. Morong, supt. Organized Sept., 1902, capitalization \$3,000,000. Has authorized a \$150,000 five-year 7% bond issue.

Lands, 2,000 acres, also coal lands about 16 miles distant. It is claimed that about \$250,000 has been expended on the mine, which shows a fair body of sulphide ore, carrying good values in copper, with a little lead, and with small values in gold and silver.

A 250-ton concentrator and a small smelter were inherited from the Estey Mining & Milling Co., previous owners, and company is supposed to have begun milling July, 1907, but did not continue long.

The company has been very free with "estimates" and promises that by merely producing 14,400,000 lbs. of copper yearly, millions of dollars could be earned. Company's advertising was indefensible, and the statement that "there has been no such opportunity for investment since the Calumet & Hecla and United Verde were first put on the market" leads to the conclusion that the promoters of the company are sadly lacking either in sense or truth. At last accounts was endeavoring to settle with bondholders by giving them the property. No recent returns received.

DIVIDEND MINING & SMELTING CO.**MEXICO**

Letter unclaimed at Kansas City, Mo. Mine office: Suaqui de Batuc, Ures, Sonora, Mex. Organized Oct., 1904, under laws of Arizona, capitalization \$1,000,000, increased later to \$2,000,000, shares \$1 par.

Lands, 195 acres, some distance from a railway, having a 75' shaft, planned to have been sunk to 500', and a 230' tunnel, planned to have been driven 2,000', latter showing argentiferous and slightly auriferous lead and copper ores, giving assays up to 23% copper and 170 oz. silver per ton. Probably closed down.

DIXIE QUEEN COPPER MINING CO., LTD.**IDAHO**

Mine address: Sandpoint, Bonner Co., Idaho. Wm. C. Ames, pres.; Chas. Edwards, vice-pres.; B. S. Bennett, sec.-treas.; E. C. Christeson, gen. mgr.; preceding officers and Ignatz Weil, directors; A. W. Nash, engr., at last accounts. Organized April 2, 1909, under laws of Idaho, capitalization \$1,000,000, shares \$1 par; issued, \$600,000. Lands, 6 claims, area 120 acres, and a 40-acre mill and tunnel site, in the Lakeview district. Lands show a vein estimated by management to average 11' 4" in width, carrying sulphide ores estimated to average 13.5% copper, 20 oz. silver and \$1.20 gold per ton, developed by an 80' shaft and tunnels of 85' and 320'. There are several small buildings. Management planned continuing development and shipping ore. No returns secured.

DIXON COPPER CO.**ARIZONA**

Letter unclaimed at Globe, Gila Co., Ariz. Fred Newmeyer, pres.; J. W. Meeham, sec., at last accounts. Capitalization \$1,000,000, shares \$2 par. Lands, 20 claims, about 9 miles northwest of Globe, near the Sleeping Beauty mountains, having a 390' crosscut tunnel with a 30' winze, showing auriferous and argentiferous copper ore. Lands were bonded, Sept., 1910, to Globe, Arizona & El Paso Copper Mining & Smelting Co., bond being said to have been for a small cash payment, and 750,000 shares of Globe, Arizona & El Paso stock. Probably idle.

DOANE-VERDE MINING CO.**WYOMING**

Idle. Office: 1204, 37 Wall St., New York. Mine near Rambler, Carbon Co., Wyo. John T. Clarke, pres.; Oliver S. Brown, vice-pres. Organized June, 1902, under laws of Wyoming, capitalization \$1,500,000 shares \$1 par. Lands, 7 claims, patented, the main tract of 60 acres lying between the Doane-Rambler and Battle Lake, the other tracts being 40 acres about a quarter mile from the Ferris-Haggarty, and 40 acres near the Hidden Treasure mine. A little work was done in an effort to strike the extension of the Doane-Rambler orebody.

DOLLY HYDE MINE.**MARYLAND**

Owned by the Linganore Copper Co., Frederick Co., Maryland. Property worked as a farm.

DOLORES MINE y ANEXAS.**MEXICO**

Owned by American Smelters Securities Co. at Matehuala, Catorce, San Luis Potosi, Mex.

DOLORES MINING & DEVELOPMENT CO.**MEXICO**

Address: care J. E. Dawson, pres., Oakland, Cal.; J. F. Torney, sec. Organized Jan., 1910, to take control of the Empire Mining Co., S. A., a company protocolized in Mexico, which owns the Major Domo claim, 5 miles from Cananea, Sonora, Mexico, and 7 other properties, including the Golden Cross silver mine, Magdalena district, Sonora, Mex. See Empire Mining Co.

DOMINION FAIRVIEW COPPER CO., LTD. BRITISH COLUMBIA

Office: 6 Holborn Viaduct, London, E. C., Eng. Mine office: Fairview Boundary district, B. C. John P. Spencer, Jas. Wm. Bryan, and Capt. John

Houston, directors; Wm. J. Spratling, sec. Organized Dec. 22, 1897, under laws of Great Britain; reorganized Sept. 22, 1901, as Dominion Fairview Klondike Syndicate, Ltd., and name changed to present title March, 1907, capitalization £130,000, shares £1 par; issued £66,077. Property consists of 4 mines known as the Wanita, Favorite, Hiram Walker and Golden Gate, each claim 1,500' square, situated in the Fairview mining camp, Okanagan district, British Columbia, about 4 miles from the United States border. Property has not been thoroughly developed, but shallow shafts and a short tunnel show a small amount of good copper ore. Property closed down. During 1910, an oil-bearing property in Roumania was acquired by company.

DOMINION MINING & SMELTING CO.

NOVA SCOTIA

Works office: Pictou, Pictou Co., N. S. Property is a 70-ton furnace, blown in May, 1907, making matte of about 35% copper tenor, when in commission.

DOMINION NICKEL-COPPER CO., LTD.

ONTARIO

Head office: Ottawa, Canada. Main office: Sudbury, Ont. Mine: Nickelton & Murray mine, Ontario. J. R. Booth, pres.; M. J. O'Brien, vice-pres.; Wm. Anderson, sec.-treas.; preceding officers, J. F. Booth, F. B. Chapin, J. J. McFadden, J. M. Glidden, C. A. Mastin and J. A. Holmes, directors; J. A. Holmes, gen. mgr.; J. N. Glidden, asst. mgr.; A. L. Winkler and Frank Eager, mine supt.; C. H. Hitchcock, mg. engr.; J. H. Roe, purch. agt.; H. L. Roscoe, chemist-assayer. Organized 1910, under laws of the Dominion of Canada, capitalization \$10,000,000, shares \$1 par, fully paid, nonassessable. Company is a close corporation with all stockholders represented on the board of directors.

Property 17,533 acres, including 10,800 acres mineral land, with 5,000 timber, 1,500 mill and smelter ground and 283 acres townsite in the Sudbury mining district, Ontario. Includes the following mines: Whistle, Wild Cat, Jackson, Nickel Lake group, W. D. 16, Elsie, Gertrude, Victor, Murray, Lady Violet and Falcon Bridge. Lands contain 21 known orebodies, 7 of which have been developed. Company has spent about \$250,000 on diamond drilling, 1907-12, principally on the North Range properties around Nickel lake and in the township of Bowell and Joe lake in the township of Wisner. The Whistle mine has been opened underground and is now ready for production. The town of Nickelton has been built at this mine.

Company has purchased several properties from the Lake Superior Corporation and now has the largest holdings of ore reserves in the Sudbury district next to those of the International Nickel Co. The diamond drilling at the Murray mine disclosed a large orebody, reported to contain over 4,000,000 tons of ore. Development will be centered at this mine.

At the Murray mine, a 1,200' three-compartment shaft is being sunk and extensive underground development is planned. Further diamond drilling will be carried on at various properties in 1913.

Smelter now being constructed in Snyder township, about 5 miles northwest of Sudbury, 1½ miles from the Murray mine, will have 3 blast furnaces of 500 tons daily capacity, 1 reverberatory furnace of 300 tons daily capacity, a converting plant with 3 basic-lined converters and will treat 1,500 tons of ore daily, turning out 80% copper-nickel matte, which will be refined at the company's own works. Mines are connected with the Canadian Pacific, Canadian Northern, Ontario and Algoma Eastern railroads by a private railroad, 6 miles long, known as the Nickel Range railway, equipped with a 75-ton locomotive and 21 cars. Company has appropriated \$3,500,000 for construction of mine and smelting plants and electrolytic refinery, all of which are expected to be completed and in operation by Sept., 1914.

Property was examined by B. B. Lawrence, of New York, on whose advice the Murray property was purchased. Property regarded as a formidable competitor of the Canadian Copper Co. in foreign markets; is amply financed and regarded as a sound mining proposition. See British-American Nickel Corporation.

DONNA DORA MINING CO.

NEW MEXICO

Mine P. O.: Organ, Donna Ana Co., New Mexico. Geo. S. Courtney, mgr., at last accounts, when management changed. Property consists of claims on the eastern slope of the Organ mountains, about 7 miles north-east of Organ. Shows a 5' fissure vein carrying a complex ore, showing galena and chalcopryrite with \$4.50 to \$50 per ton in gold and silver. Mine examined, 1911, by E. E. Chase and Jas. E. Douglas. Has 400' tunnel and shallow shaft. Equipped with hoist, 10-drill Rand compressor and a 150-ton concentrator.

DONNELLY MINING & REDUCTION CO.

COLORADO

Idle. Mine office: Lake City, Hinsdale Co., Colo. Property carries auriferous and argentiferous lead and copper ores. Equipment includes water power and an air compressor. No report obtainable, 1913.

DOS DE ABRIL MINING CO.

MEXICO

Mine office: El Dorado, Jimenez, Chihuahua, Mex. Heffron & Piper, lessees, at last accounts. Mine has auriferous and argentiferous lead and copper ores, with steam power and a 7-stamp mill. Idle owing to revolutionary disturbances.

DOUGLAS COPPER CO.

ARIZONA

Office and secretary: Fred L. Mason, P. O. Box 421, Globe, Ariz. T. C. Hendricks, pres.; H. M. Foster, vice-pres.; Chas. Davis, supt. Organized Aug., 1910, under laws of Arizona, capitalization \$1,125,000.

Lands, 35 claims, about 30 miles from Globe on the wagon road, about midway between the towns of Ray and Superior, Pinal county, Ariz. Property is traversed by several northwest-southeast fissure veins of limestone and quartzite, carrying gold, silver and copper in oxidized ores or as bornite and chalcopryrite. Developments by 2 tunnels, a shallow shaft and a number of open cuts, all on one large vein. In Feb., 1913, work was begun on 3-compartment shaft which cut a silver vein at 40' in depth and on which development was being done on the 100' level in May. Management expects to sink shaft to 500' in depth. Property lies west of the limestone uplift in which the Newman group is located. From personal inspection, the claims are regarded as a long chance.

DOUGLAS-ELY MINES CO.

NEVADA

Apparently dead, letters being returned from both office and mine. Described Vol. X.

DOUGLAS, LACEY & CO.

NEW YORK

Company was notorious promoter of numerous mining and oil propositions and is now in hands of a liquidating organization, known as the Amalgamated Properties, Inc. Mr. Steven's opinion of this firm and their clever scheme for obtaining money from small investors is fully described in Vol. X, under the title given above and that of the Amalgamated Gold & Copper Co. of Arizona.

DOUGLAS SMELTER.

ARIZONA

Owned by Copper Queen Consolidated Mining Co., at Douglas, Cochise Co., Ariz.

DOUGLASS COPPER CO.

MICHIGAN

Office: Sears Bldg., Boston, Mass. Property north of Allouez and west of Ahmeek holdings in Allouez township, Keweenaw county, Mich. Charles J. Paine, Jr., pres.; George P. Gardner, vice-pres.; Arthur E. Coe,

sec.-treas.; preceding officers, R. S. Sheldon, C. C. Douglas, W. A. S. Chrimes and A. S. Knight, directors. Organized 1913, under laws of Michigan, capitalization \$2,500,000, shares \$25 par; 50,000 shares given for land, marked \$10 paid in value.

Property consists of 440 acres in a compact tract, being E.½ of Sec. 30 and W.½ of Sec. 29, embracing eleven 40-acre tracts formerly owned by the Sheldon Douglas and the Narthey estates, and the St. Mary's Mineral Land Co. This tract covers the underlay, or deep extension of the Kearsarge lode into which the rich oreshoot now worked in the Ahmeek, pitches. To open this ground a 3,300' vertical shaft must be sunk.

The company is currently regarded as merely a convenient holding corporation to acquire title to ground desired by the Calumet & Hecla.

DOYLE CONSOLIDATED MINES CO.

COLORADO

Office: 507 E. St. N. W., Washington, D. C. Mine office: Mancos, Montezuma Co., Colo. Hon. Jas. Doyle, pres.; Earl P. Hopkins, vice-pres.; E. R. Marden, sec.; D. T. Thompson, treas.; preceding officers, Wm. W. Fry, and J. J. Butler, directors; R. J. Doyle, mine supt.; R. C. Morrison, mill supt.; C. F. Doyle, engr. Organized Oct. 21, 1907, under laws of Arizona, as consolidation of the Mancos Mining & Development Co., the Cliff Dwellers Gold Mining Co. and the White Quail Copper Co., capitalization \$10,000,000, shares \$1 par, nonassessable; issued about \$3,000,000.

Property, 31 claims, in 3 groups of about 300 acres in Rush basin, part of the California mining district, Montezuma and La Plata counties, in southeastern Colorado. Claims are in a high part of the Sierra La Plata, 3½ miles from La Plata city and 4 miles from the Colorado Southern railroad. The White Quail group shows a copper-bearing "dike" of monzonite porphyry, said to be 150' across and to average 2½% copper and \$4 gold across its entire width. Other claims cover about a mile of the apex of the Sundown (or North Star) vein, a flat, dipping fissure in red quartzite, carrying milling ore with gold and silver values. Company developed properties for several years. Had 10-stamp mill in 1910 and erected a new 150-ton mill, operated July, 1912.

DRAGON CONSOLIDATED MINING CO.

UTAH

Office: care Knight Bros., Provo, Utah. Mine near Tintic, Juab Co., Utah. Jesse Knight, pres.; J. Will Knight, vice-pres.; W. Lester Magnus, sec.-treas.; R. E. Allen and A. M. Knight, directors; E. R. Higginson, supt. Organized about April, 1911, under laws of Utah, capitalization \$2,000,000, shares \$1 par; issued 1,750,000; 250,000 in treasury.

Property, 40 claims, patented, comprising the Dragon and Governor groups in Tintic district. The Governor group has 2,000' or more of the big Iron Blossom fissure in limestone, from which the great production of that and the Sioux mines has come. The Dragon group shipped 100 tons per day of iron ore to the U. S. smelter, for a long time. The Governor ground has a rich orebody of copper-silver ore developed by drifts from the Iron Blossom on the 300', 600', 800' and 1,000' levels, showing a 20' vein with 0.5 to 10% copper and 20 to 50 oz. silver. Part of the property is worked through the Black Jack shaft and in 1913 the new work in the porphyry area showed stringer veins carrying lead and copper ore. Present output is about 125 tons per day from the Iron Blossom shaft. Property produces considerable copper, but is generally and rightly regarded as a silver mine.

DRUID GOLD MINING CO.

COLORADO

Office: 418 Boston Bldg., Denver, Colo. Geo. E. Collins, E. M., manager, Central City, Gilpin Co., Colo. Property has a vein of complex lead-

copper ore carrying silver and gold, that is developed by a 1,500' tunnel and a 500' shaft. Equipped with steam plant.

DRY CANYON MINES CO.

UTAH

C. F. Wagner, sec., Stockton, Utah. Mine near Ophir, Tooele Co., Utah. Lands, 25 claims, known as the Kearsarge mine, said to have been large producer of high-grade silver-lead ore in 1870-80. Shipped, June, 1910, a carload of ore assaying about 3% copper and \$7 gold per ton, with values mainly in silver-lead, netting \$47 per ton. Probably closed down. Has 2,500' tunnel.

DUBUQUE MINING & TUNNEL CO.

COLORADO

Idle. Office: Coburn Bldg., Denver, Colo. Mine near Idaho Springs, Clear Creek Co., Colo. E. A. Colburn, pres.; W. W. Kirby, vice-pres.; J. A. Wright, sec.-treas.; preceding officers, B. L. Gorich and D. C. Waugh, directors. Organized Dec. 4, 1905, under laws of Colorado, capitalization \$2,000,000, shares \$1 par. Lands, 2 claims, known as the Dubuque mine, opened by a 460' tunnel, said to show a 6' vein carrying a 3' paystreak carrying copper carbonates and melaconite, with good gold values.

DUCKTOWN SULPHUR, COPPER & IRON CO., LTD. TENNESSEE

Office: 1 Gresham House, Old Broad St., London, E. C., Eng. Mine office: Isabella, Polk Co., Tenn. J. G. Gordon, chairman and managing director; L. G. Mortimer, vice-chairman and managing director; preceding officers, Col. J. Le G. Daniell, H. G. Palmer, Edward Dexter and Col. H. B. Mortimer, directors; Windsor Berry, sec.; William Young Westervelt, New York, cons. engr. Executives at the mine: C. W. Renwick, gen. mgr.; W. F. Lamoreaux, asst. gen. mgr.

Organized under the laws of Great Britain, Feb. 16, 1891, capitalization £75,000, shares £1 par, in £74,800 ordinary shares and £200 founders' shares. Increased 1907, to £200,000 shares, increase subscribed to by the old stockholders at par, except £48,799 ordinary shares sold to the public at 25s. Stock is fully issued and fully paid. Profits are divisible on the basis of 7%, plus, one-half of the net remaining profits, to ordinary shares, balance of profits going to founders' shares. £130,000, first mortgage, 6½%, debentures outstanding, against which special redemption fund of £10,000 was set aside during 1912, in addition to a general reserve fund of £45,000, previously accumulated.

Recent dividend payments have been: In 1906, 82½% on ordinary shares, £249:3 per founders' share; in 1907, 55% on ordinary shares, £108:18 per founders' shares; in 1908, 10% on ordinary shares, £16:0:8 per founders' shares; in 1909, 10% on ordinary shares, £21:17 per founders' share; in 1910, 10% on ordinary shares, £28:4:5 per founders' share; in 1911, 10% on ordinary shares, £29:19:5 per founders' share; in 1912 12½% on ordinary shares, £54:18:11 per founders' share; total dividends, including 1912, paid to all classes of shares, £438,183. Of this, £282,628, amounting to 335⅓% on shares outstanding at the times of payment, was paid to the ordinary shares, and £155,555, amounting to 77,778%, was paid to the founders' shares, the latter constituting the world's record for profitable copper-mining investment.

Property consists of nearly 7,000 acres of land, bought for £68,057, including the Mary, East Tennessee and Isabella mines, which are active, and the Calloway and Cherokee mines which are idle. Country rocks consist largely of very tough highly metamorphosed, silicified mica schists, of ancient origin. The ores are exclusively sulphide, averaging about 2½% copper and containing minute quantities of gold and silver, sufficient however to be appreciable to the matte.

The Mary mine, which is and has been the principal producer, has

heretofore yielded largely through the 3-compartment 350' Baxter shaft, and from the 2-compartment 375' No. 2 shaft. The new Gordon, 3-compartment 860' shaft is at present, however, and will continue to be, the principal producer. The greater part of the Gordon shaft was sunk, 3 years since, in 12 months' time, by the employment of 5 upraises made on the line of the shaft from various levels. Diamond-drill borings prove the ore to continue to a depth of at least 1,000' beneath the surface, with a steadily increasing copper content. The ore actually blocked out in the Spring of 1913 was in excess of 580,000 tons, averaging over $2\frac{1}{2}\%$ copper and 17% sulphur.

The East Tennessee mine, which had laid idle since early days, did not commence to produce until 1910. The Thomas, or operating shaft, is 700' deep, has 2 compartments and yields from 50 to 75 tons per diem of ore containing about $3\frac{1}{2}\%$ copper and 10% sulphur. Reserves of nearly 50,000 tons of average ore had been proven in the spring of 1913.

The Isabella mine has thus far yielded but a few thousand tons of ore a year, from open-cut workings left on the removal of the gossan as iron ore. The ore, averaging about 0.8% copper and 29% sulphur, has as yet been used for little else than experimental purposes. 5,600' of systematic diamond drilling, however, has already revealed over 2,500,000 tons of average ore with excellent prospects beyond, so that doubtless the property will, eventually, be worked on a considerable scale for acid and iron manufacture.

The power plant at the smelter was enlarged in 1910 and changed from direct to 440-volt, 60-cycle, 3-phase, alternating current, two 500-kw. Westinghouse-Parsons turbine generator units being installed, including air compressor for acid plant, etc., about 1,500 h. p. The smelter, which is located at Isabella on the company's private, standard-gauge railway, about $2\frac{1}{2}$ miles from the Mary mine, consists primarily of two 500-ton, sectional water-jacket blast furnaces. These furnaces are operated by induction motor Connersville blowers of 300 cu. ft. per revolution aggregate capacity, charged with Freeland patent electrical charges and served with electrical traveling crane for the mattes and belt bucket elevators for the granulated slag. Since 1905, when heap-roasting was abandoned, semi-pyritic smelting, introduced into this country from Tasmania by this company, has been employed. The first fusion gives a matte containing from 15 to 20% copper and disposes of the bulk of the non-valuable material of the ore in a slag containing from 0.2 to 0.3% copper. This coarse matte is then raised to 50% copper content by a second fusion in the same furnace, usually undertaken once a week. A small percentage of coke, with cold blast of from 20 to 30 oz. pressure is used in both fusions. The 50% matte is sold to the American Metal Co., of New York, and treated for them at the Laurel Hill, L. I., or the Carteret, N. J., smelters.

In 1905, investigations were undertaken to determine the possibility of making sulphuric acid from the smelter fumes. In 1906, an experimental contact plant was erected but proved unsuccessful, and in 1908, work on the present chamber acid plant was commenced. This plant, which cost over \$600,000, was put into operation in less than a year from the time of breaking the ground for its erection and has since been producing at the rate of from 40 to 50 thousand tons per annum of 60° Beaume sulphuric acid. It was the first acid plant to successfully convert sulphuric gases from pyritic smelting into concentrated acid.

The credit for the successful development of the company is due primarily to the chairman and managing director, Mr. Gordon, himself a technical man, to the consulting mining engineer, Mr. Westervelt, who

developed the mines, to the former manager, Mr. W. H. Freeland, assisted by the present manager, Mr. Renwick, who developed the pyritic smelting process employed, and to Mr. N. L. Heintz, chemical engineer, who designed and erected the present acid plant.

Recent production has been as follows: In 1910, 4,409,000 lbs. of fine copper and 46,800 tons of 60° B. sulphuric acid; in 1911, 5,040,000 lbs. of copper and 45,600 tons of sulphuric acid; in 1912, 5,213,000 lbs. of copper and 48,100 tons of sulphuric acid. The company is managed with commendable financial probity, technical ability of a high order, and is heartily endorsed as worthy of confidence and investment.

DUGWAY COPPER MINING & SMELTING CO.

UTAH

Office: 301 Felt Bldg., Salt Lake City, Utah. Mine office: Clover, Tooele Co., Utah. O. P. Peterson, pres. and gen. mgr.; P. C. Kittle, vice-pres.; A. V. Peterson, sec.; O. F. Peterson, treas.; preceding officers, A. E. H. Peterson and H. B. Windsor, directors. Organized June 13, 1902, under laws of Utah, capitalization \$30,000, shares 10 cts. par, assessable; issued, \$22,506.20. Annual meeting, third Tuesday in July.

Lands, 6 claims, area 118 acres, in the Dugway district, 43 miles from a railroad. Property shows an ore zone, reported by company to be 300' wide on the 325' level, carrying a number of orebodies, 3 under development, that carry chalcopryite, bornite and argentiferous galena, giving assays of 1 to 15% copper, up to 30% lead, up to 7% zinc, up to 66 oz. silver, and \$1.60 gold per ton. Development is by a 333' shaft, and tunnels of 60', 117' and 460', with about 1,000' of workings, showing considerable ore of good average assay tenor. Mine has no power equipment.

DUKE MINE.

NORTH CAROLINA

Office: care Brodie L. Duke, owner, Durham, N. C. Mine office: Roxboro, Person Co., N. C. Lands, 470 acres, formerly known as the Tingen mine, showing fissure veins carrying copper ores, with gangue of epidote, calcite and quartz. Has 4 shafts, deepest 200'. Mine has produced some high-grade ore, the last carload shipped averaging about 17% copper, and netting \$1,100. Ore is high in grade, but occurs in narrow veins, like the other mineral deposits of North Carolina. Equipment includes steam power. Work was resumed, on a small scale, Jan., 1911, but mine now probably closed down.

DULUTH & CHIRICAHUA DEVELOPMENT CO.

ARIZONA

Reorganized, 1912, as Sullivan Development Co., which see.

DULUTH-LEMHI MINING CO.

IDAHO

Office: 416 Lonsdale Bldg., Duluth, Minn. Mine office: Baker, Lemhi Co., Idaho. Capt. J. H. Lanyon, pres. and gen. mgr.; A. R. Anderson, vice-pres.; W. H. Locker, sec.-treas.; preceding officers, C. H. Bird, H. P. Gill, and P. J. Blais, directors. Organized Aug., 1910, under laws of Minnesota, capitalization \$250,000, shares \$1 par, nonassessable; issued, \$130,000. Annual meeting, first Tuesday in August.

Lands, 6 claims, area 120 acres, said to carry 1,000,000' of standing white pine, also a 7-acre mill site, 3 miles from a railroad, in the Wimpey Creek district. Property shows diorite-porphry carrying 2 orebodies, of 4' and 16' estimated average width, traceable 1,800', carrying cuprite, azurite, malachite, and chalcopryite, estimated by the Duluth office to average 8 to 12% copper, 33.68 oz. silver and \$60 gold per ton, and estimated by Capt. Lanyon, on the ground, to average 6% copper, 4 oz. silver and \$8.50 gold per ton. Property is independently reported to have a 2' vein giving assays of \$25 to \$75 gold per ton, and a large orebody assaying about 3% copper. The mine has a 140' tunnel, planned to be driven 427'. Work was

begun July, 1910, and management plans continuous development by a main tunnel, to have a back of 1,200' by 1914.

DULUTH-MOCTEZUMA MINING CO.

MEXICO

Office: Room 610, Lonsdale Bldg., Duluth, Minn. Geo. H. Crosby, pres.; Cassius Bagley, vice-pres.; A. Rabideau, sec.; A. J. McLennan, treas., all of Duluth. Company owns various undeveloped copper and silver properties in the Moctezuma district, Sonora, Mex., but lost the Monte Cristo mine, on which a payment of \$50,000 had been made, its only producing property. In 1910, company began with quick assets of \$75,350 and liabilities, exclusive of bond, of only \$8,225, but bought the Comet mine at Hailey, Blaine Co., Idaho, in June, 1910, and was badly stung, sinking its surplus funds therein and this loss, together with the faulting of the vein, has put the company in rather hard circumstances, badly clouding its former bright prospects.

In 1912, company took a lease on a 30 ct. royalty basis, on 40 acres of iron land in the Cuyuna range, Minn. Drilling has proven about 1,000,000 tons commercial ore and 500,000 of 40% ore on a small part of this tract. At a stockholders' meeting held Oct. 28, 1913, the company granted a 40-day option on an assignment of the above lease to the Moctezuma Iron Co., capitalization \$50,000, shares \$1 par. If \$10,000 or more of its stock is subscribed for, this company agrees to pay off the Duluth Moctezuma indebtedness of \$7,500 in full payment of the transfer of the lease. As this company is in debt, has no funds and its only asset of value is the iron land lease, whose royalties must be paid, the Duluth Moctezuma Co. must cease business and its stock is valueless.

DULUTH-SONORA COPPER CO.

MEXICO

Office: 312 Sellwood Bldg., Duluth, Minn. Mine: Cananea, Sonora, Mex. James W. Norton, pres.; B. Silberstein, vice-pres.; R. P. Burgan, second vice-pres.; W. D. Underhill, sec.; Theron H. Hawkes, treas.; preceding officers, Geo. M. Tallant and A. F. Norton, directors. President reports himself as general manager, mill superintendent, mining engineer and chemist-assayer, and Mr. P. C. Probert, as mine superintendent, smelter superintendent and purchasing agent.

Property consists of 1,466 hectares, or about 3,621 acres, embracing a part of the former holdings of the Calumet & Sonora Co., and the South Cananea, or Mitchell, property. The latter shows a strong vein with wide silicious outcrop and has been developed by a 400' shaft and some underground work, but an examination of dumps fails to show ore. Norton shaft, one-fourth mile distant, now filled with water, is said to be 293' deep and to show good ore, but none is seen and outcrop is unpromising. Remainder of property not considered worth taxes. Company holdings considered valueless except for grazing purposes, or to sell stock to confiding investors. Property has been examined by Verne A. Hart, M. E., Cananea, and Walter Harvey Weed. Has been idle since 1910.

DULUTH & UTAH DEVELOPMENT CO.

UTAH

Idle. Office: 503 Utah Savings & Trust Bldg., Salt Lake City, Utah. E. J. Raddatz, pres. and treas.; Peter Porter, vice-pres.; Harvey J. Jones, sec. Organized under laws of Utah, capitalization \$500,000, shares \$10 par, as successor of No-U-Dont Mining & Milling Co.

Lands, 4 fractional claims, area about 50 acres, near the Honerine tunnel and next north of the Honerine mine, which carries copper, at considerable depth. Mine has 2 shafts, deepest 500', with about 3,000' of workings, and, under former ownership, produced silver-lead ore from above the 500' level, shipments being said to have returned 35 to 60% lead and 20 to

30 oz. silver per ton, and to have aggregated \$250,000 in value. Copper ore is expected at depth.

DUNLAP COPPER MINE.

NEVADA

Address: Mina, Mineral Co., Nev. R. W. Hadden, cons. engr., 220 Higgins Bldg., Los Angeles, Cal. Property, 10 claims, 200 acres and mill site in Silver Star mining district, 10 miles east of Mina. Claims show quartzite and quartzite breccia with mineralized zone 700' wide and 2,000' long, carrying ore-bearing reefs with oxides, carbonates, and native copper, values ranging from 1½ to 20% copper.

Development by several thousand feet of tunnel, open cuts and winzes, mostly in ore, but none showing sulphide, as water level is not reached. Concentration test on 10 tons yielded product with 44% copper, \$8 gold and 8½ oz. silver. Equipment includes compressor, blacksmith shop, etc. 250,000 tons of ore said to be available, but not blocked out.

DUPLEX MINE.

NEVADA

Address: Searchlight, Clark Co., Nev. G. F. Coulton, owner and mgr. Property is a well-known gold mine, showing veins in quartz monzonite, carrying gold-silver ores, changing to copper at depth. The Fraction, or New Year's Gift vein, shows 7' of 10% ore with \$12 in gold on the 700' level. A 28-ton carload of picked ore shipped in Aug., 1913, yielded 3 oz. gold, 30 oz. silver, 11% copper and 18% lead, this being the first copper ore mined in commercial quantities in the camp. Property equipped with stamp mill, in which operations will be resumed when property is opened up between 500' and 700' levels.

DUQUESNE MINING CO.

ARIZONA

Address: care T. A. Luckhart, sec., DuBois, Pa. Mine near Globe, Gila Co., Ariz. Geo. M. Luckhart, pres. and mgr. Organized 1909, under laws of Arizona, capitalization \$1,000,000, shares \$1 par.

Lands, 12 claims, in Gold gulch, about 3 miles south of the Arizona National and 15 miles west of Globe, in the Pinal mountains. Mine has a 10' vein, carrying mainly silver-lead ore with copper expected at depth, opened by 3 tunnels, 2 of 200' and 300', showing ore assaying well in gold, and a 50' shaft on the East End claim showing ore giving assays of 5% copper, 3 oz. silver and \$4 gold per ton. Equipment includes a 25-h. p. gas-line hoist. Mine was shipping, 1912.

DUQUESNE MINING & REDUCTION CO.

ARIZONA

Main office: Westinghouse Bldg., Pittsburgh, Pa. Mine office: Duquesne, Santa Cruz Co., Ariz. Geo. Westinghouse, pres.; W. D. Untergraff, sec.-treas.; Chas. A. Bankerd, agt.; H. T. Herr, vice-pres. and gen. mgr. Lands, 84 claims, patented, area 1,000 acres, near the Pride of the West and several miles south of the Mowry, in the Washington camp, Patagonia mining district, Ariz. Property shows a contact deposit between limestone and granite-porphry, carrying argentiferous and auriferous chalcoppyrite, sphalerite, galena and pyrite, opened by a shaft 650' deep. Ores being complex sulphides, are very refractory. Property sometimes called the Washington mine, is said to have large bodies of complex ore which have been the subject of numerous experiments in wet, electrolytic, magnetic, dry and other systems of concentration for many years past. At present the workings on the Bonanza mine are 650' deep and the Duquesne shaft 120' deep. The Bonanza shaft is equipped with a 50-h. p. steam hoist and an Ingersoll compressor. The Duquesne shaft has a 12-h. p. gas-line hoist.

The mine is shipping to the Douglas-Arizona smelter since Aug., 1912. Ore is hauled by wagon 23 miles to Patagonia, the shipments at present running about 14% copper and 5 oz. in silver per ton. Production for 3

months in 1912 was 466 tons averaging 15% copper, producing 157,707 lbs. fine copper.

DURANGO SMELTER.

COLORADO

Owned by San Juan Smelting & Refining Co., which is controlled by the American Smelting & Refining Co., at Durango, La Plata Co., Colo.

DURANT MINING & SMELTING CO.

MONTANA

Address: Spring Gulch via Martinsdale, Meagher Co., Mont. C. M. Durant, supt. Property 14 miles from Martinsdale, shows fissure veins carrying copper sulphide ore with gold values. Developed by 200' two-compartment shaft sunk in 1912.

DURAZNITO; COMPANIA MINERA EL.

MEXICO

Office: Apartado 102, Durango, Mex. Mine office: Tejaman, Durango, Mex. Edw. Williams, pres.; Alejandro Tagle, sec.; J. L. Asunsolo, treas.; F. D. Davis, mgr., at last accounts. Organized March, 1906, under laws of Mexico, capitalization 60,000 pesos, shares 10 pesos par. Lands, 8 hectares, carrying 1 silver-lead and 1 silver-copper vein, former having ore said to average 10% lead and 6 kgs. silver per metric ton, and latter said to average 6 to 8% copper and 8 kgs. silver per ton. Development is by 2 shafts, of about 60 meters depth each, and a 180-meter tunnel. No returns secured and property probably closed down owing to revolution.

DUSTON COPPER GROUP.

MONTANA

Located in Sanders Co., Mont., 6 miles north of Perma, on the N. P. R. R., on the Flathead reservation. Property, 5 claims, unpatented, only 1, the Duston, being developed. Vein occurs along contact between granite and porphyry, is developed by a 100' tunnel showing an ore-body 50' long, 4½' wide, carrying 16% copper, 2 oz. silver and good gold values. Only annual assessment work is being done. Property adjoins the Camas Copper Mining & Milling Co..

D. & W. MINING CO.

CALIFORNIA

Office: Johnston Bldg., Los Angeles, Cal. Mine office: Parker, Yuma Co., Ariz. John W. Flink, pres. and gen. mgr.; Sylvester Marshall, vice-pres.; Jas. S. Roche, sec. Lands are in the Whipple Mountain district of San Bernardino county, California, about 5 miles from the Santa Fe railroad, 17 miles north of Parker and about 40 miles south of Needles. Mine reopened Sept., 1911. Property developed by a 700' shaft with levels at 100', 200', 300' and 700', opening up a vein said to be 18' wide carrying milling copper ore with gold values. On 700' level vein is opened by drift for 325', said to be all milling ore. At 400', an east crosscut cut a second vein showing copper ore with free gold, the tunnel cutting vein at 100' depth. President claims 3,500' underground work.

Equipment consists of 18-h. p. gasoline hoist, Ingersoll-Rand compressor driven by 42-h. p. gasoline engine. Company plans installing 100-ton mill plant consisting of a Lane mill, 4 Johnson tables and a 40-h. p. engine.

Company acquired the Eagle American group in 1912, which is reported to have 7% copper ore on 300' level.

EAGLE AMERICAN GROUP.

CALIFORNIA

Property sold, 1912, to D. & W. Mining Co., San Bernardino, Cal.

EAGLE & BLUE BELL MINING CO.

UTAH

Office: 60 Congress St., Boston, Mass. Operating office: 404 Dooly Block, Salt Lake City, Utah. Mine office: Eureka, Juab Co., Utah. Jas. P. Graves, pres.; Henry N. Sweet, vice-pres.; Imer Pett, gen. mgr. and asst. treas.; preceding officers, Fred H. Williams, Duncan MacVichie, Fred R. Sands and Geo. E. Davis, directors; Sidney S. Millett, sec. and treas.; Wm. Owens, mine supt.; Fred R. Sands, purch. agt.

Organized Sept., 1898, under laws of Utah, capitalization \$250,000, increased, March, 1910, to \$1,000,000, shares \$1 par; issued 893,146 shares. Dividends paid Feb., 1913, at 5 cts. per share, \$44,657.30 and on April 1, 1913, \$44,657.30. In March, 1910, issued 644,347 shares of new stock at 50 cts. to take up a floating debt of \$269,925 and put \$50,000 in the treasury, for working capital. Is controlled, through stock ownership, by Bingham Mines Co. First National Bank, Boston, registrar; Federal Trust Co., Boston, transfer agent. Stock is listed on the Boston curb. Annual meeting, first Saturday after first day of October. Net profits for first 7 months of 1913 have been \$120,000. In August, company is reported to have taken an option on the adjoining Victoria property.

Lands, 17 claims, area 83 acres, including a 9-acre mill site carrying the water right to a spring having a flow of about 50 gals. per minute. Lands lie between the Centennial-Eureka, Victoria and Chief Consolidated mines, on the Victoria-Grand Central ore zone, in the Mammoth Limestone. The lime is cut by numerous fissures, at all angles, with mainly vertical dip, carrying pipes, shoots and erratic deposits of ore at the intersections of fissures and bedding planes, in massive blue limestone, the main orebody being a system of pipes, roughly continuous, with a rake of about 30° S. The mine has considerable bodies of silicious copper ore and lead sulphides. A new orebody, cut 1913, on the 700' level, possibly is in a new ore channel. Development originally by tunnel, with a 1,200' blind shaft, showing, on the bottom level, an orebody up to 66' in width, said to assay \$10 to \$20 per ton in copper, silver and gold.

Development in the last 3 years has been extensive; the shaft is now 1,350' deep, or 116' below the 1,300' workings. On 700' level a large body of silver-lead has been opened up. On the 1,300' an orebody, 10 to 70' wide and 20 to 50' high has been developed for 600' north and south, occurring in a fractured zone as replacement of country rock and has yielded silicious ore carrying gold and silver. On 1,350' level, the deepest in the mine, good ore has been encountered and followed down 170' by a winze, in 1913. The development for the year 1912 amounted to 2,579' besides the sinking of the shaft.

Equipment includes a steam plant with a 180-h. p. Hendrie & Bolthoff double-drum hoist, good for 2,000' depth, a new 100-h. p. tubular boiler and a 4x6' electric Triplex pump.

Production for 1912 was 22,341 tons, netting \$207,411 and containing 50,913 lbs. copper, 1,303,294 lbs. lead, 341,164 oz. silver, 5,833 oz. gold, being larger than any preceding year.

Property in favorable condition, physically and financially, and management able.

EAGLE COPPER CO.

CALIFORNIA

Address: Taylorville, Plumas Co., Cal. Owns group of claims covering low-grade pyritic deposit with limited development. Company built small smelter, 1912.

EAGLE COPPER-GOLD MINING CO.

ARIZONA

Dormant. Mine near Wickenburg, Maricopa Co., Ariz. Wm. F. Kuder, pres.; Henry Wehner, vice-pres.; A. L. Motts, sec.; J. L. Zesiger, treas.; preceding officers, Henry Biddle, J. W. Lowe, E. L. Motts and C. A. Schettler, directors, at last accounts. Organized Sept. 8, 1902, under laws of South Dakota, capitalization \$1,000,000, shares \$1 par.

Lands, 7 claims, 1 fractional, area 130 acres, known as the Profusion group, in the Blue Tank and Black Rock districts, in the foothills of the Bradshaw mountains, 12 miles east of Wickenburg, with connection by 10 miles of good and 2 miles of bad wagon roads. Lands are reported to

show 5 orebodies, of which 2 are partially developed, 1 of 12' average reported width, traceable 3,000', carrying native copper, cuprite, malachite and chalcopryrite, giving average assays of 4% copper, 2 oz. silver and \$3.10 gold per ton. Development is by tunnels of 35' and 193', and by shafts of 50', 60', 100' and 150'. Has a 16-h. p. gasoline hoist and 4-drill air compressor, with 7 mine buildings. Not favorably regarded.

EAGLE COPPER MINING CO.

UTAH

Mine office: Santaquin, Utah Co., Utah. Armon Cravens, pres.; C. W. Higginson, vice-pres.; C. E. Snell, sec.-treas.; J. T. Openshaw, supt. Organized May, 1907, under laws of Utah, capitalization \$1,000,000, shares 10 cts. par. Mine, on Mount Nebo, east of Santaquin, has shipped a little high-grade lead and copper ore. Developing with a small force June, 1913.

EAGLE GOLD COPPER & MINING CO.

ARIZONA

Address: care W. J. Riley, First National Bank, Clifton, Ariz. Mine near Morenci, Greenlee Co., Ariz. Wm. M. McCoy, pres. and mgr.; E. V. Horton, J. R. Hampton, J. R. McRea, M. H. Kane and E. C. Bunker, all of Clifton, directors. J. J. Hall, mine supt. Property, 20 claims, 4 miles northwest of Morenci, carries veins with copper, lead and gold ores, developed by a 40' shaft on 1½' vein of rich silver lead ore. Shipped 7.4% copper ore, 1912, to the Shannon smelter. Equipment includes 5-stamp gold mill, running in 1912.

EAGLE METALLIC COPPER CO.

PENNSYLVANIA

Address: care H. D. Deschler, Belvidere, N. J. Branch office: 208 Haas Bldg., Allentown, Pa. Mine office: R. F. D. 3, Fairfield, Adams Co., Pa. F. H. Cuyle, pres.; Dr. P. A. Stem, vice-pres.; A. L. Wickert, sec.; Thos. Zellner, treas.; Owen H. Nagle, gen. mgr.; preceding officers and A. V. Diefenderfer, directors. Organized 1903, under laws of New Jersey, capitalization \$500,000, shares \$1 par, and reorganized, Dec. 9, 1910, under laws of Pennsylvania; \$150,000 in treasury after raising \$60,000 to build a smelter in 1911.

Property, 500 acres in Jacks Hollow, on the Maryland border, one-half mile from and crossed by the Western Maryland railroad, near Charmian. Claims show a mineralized zone in trap rocks said to be of 400' average width, carrying native copper, chalcocite, bornite, chalcopryrite and tetrahedrite, averaging about 2½% copper, 2 oz. silver and a trace of gold per ton. Development is by open-quarry work from pit 200' across connected with smelter by 750' aerial rope tram.

Equipment includes a 250-h. p. steam plant, 150-h. p. engine and a 2½" core drill, with a 24x30' office and laboratory. Smelter built in 1911 with 10x12' dust flue, 78' long with 104' stack, for 175-ton blast furnace. Regarded as a poor investment.

EAGLE MINE.

CALIFORNIA

G. H. Goodhue, owner, Indian Falls, Plumas Co., Cal. Property at Genesee, Plumas county, consists of 15 claims, 300 acres, covering 8 outcropping orebodies, discovered, 1908, and occurring at contact between limestone and porphyry and as lenses in schist. Ore zone runs N. 27° W., dips 55° S. W. Ores contain chalcopryrite and bornite and are said to average 2% copper, 1½ oz. silver and \$2.40 gold per ton.

Development, 342' of workings, including 9 shallow shafts, 12 to 18' deep and a 210' tunnel, all in ore. Property 20 miles from Western Pacific railroad. Tunnel will be extended, 1913.

EAGLE MINE

COLORADO

Property on Siegel mountain at Animas Forks, San Juan Co., Colo., shows strong fissure vein in which an 18" pay streak of gray copper ore carries very high silver values.

EAGLE MINING CO.**MONTANA**

Office and mine: Butte, Silver Bow Co., Mont. Hon. Patrick Mullins, Arthur V. Corry and Thos. Bryant, directors. Organized March 10, 1906, under laws of Montana, capitalization \$150,000, shares \$1 par, and is supposed to have increased capitalization, April 29, 1907, to \$250,000, shares 50 cts. par. Lands, north of La France, have a 250' shaft, showing a 5' vein. Property formerly was a silver mine, shipping ore running up to 1.7% copper and 186 oz. silver per ton. Idle several years.

EAGLE MINING & SMELTING CO.**WASHINGTON**

Idle. Mine office: Chewelah, Stevens Co., Wash. Mark Mitchell, mgr., at last accounts. Lands, 6 claims, 3 miles from Chewelah, including the Eagle group of 4 claims, formerly owned by Eagle Consolidated Gold Mining & Milling Co., and later by Blue Star Mining Co. Mine has a 240' two-compartment shaft, and an 800' tunnel, showing a 4' vein of silver-lead ore, said to parallel the copper vein of the United Copper Co., at a distance of 400'. Equipment includes a steam plant.

EAGLE MOUNTAIN COPPER CO.**ARIZONA**

Mine office: Kelvin, Pinal Co., Ariz. Col. P. T. McGrath, gen. mgr., but his whereabouts are unknown there. Lands, 27 claims, known as the Copper Queen group, in the Riverside district, having small development, with several mine buildings. Idle several years and lands of doubtful value.

EAGLE PEAK COPPER MINING CO.**WASHINGTON**

Mine office: Longmire, Pierce Co., Wash. Main office: Tacoma, Wash. R. H. Wheelock, pres., Ashford, Wash.; Bakier Long, vice-pres. and mgr.; M. A. Long, sec.-treas.; preceding officers, G. W. Anderson and Chas. Metzler, directors. Organized 1908, under laws of Washington, capitalization \$150,000, shares \$1 par, fully paid and nonassessable; issued, 130,000. Annual meeting, April 21.

Property, 2 claims, 40 acres in Cascade mining district, 14 miles from railroad, in the heart of the Tatoosh range, near Mt. Tacoma. Claims show fissure veins in granite with ore carrying bornite and chalcocite and said to average 17% copper, \$4 in gold and some silver. Development by shaft and tunnel. Equipment includes 25-h. p. power plant, air compressor and 4 buildings.

EAGLE VALLEY MINING & MILLING CO.**NEVADA**

Mine near Carson City, Ormsby Co., Nev. Jas. E. Sellers, pres.; Milan A. Moffatt, mgr., at last accounts. Lands, 3½ miles from Carson City, show outcrops of auriferous copper ore, said to give assays up to 45% in copper tenor. Mine has a drift tunnel, and was developing with a small force, at the end of 1910. No returns secured.

EAST BUTTE COPPER MINING CO.**MONTANA**

Office: 85 Devonshire St., Boston, Mass. Mine and works office: Butte, Silver Bow Co., Mont. Robt. H. Gross, pres.; Hon. Jas. H. Reed, vice-pres.; Wm. P. Everts, sec.; Frank P. Son, treas.; Oscar Rohn, gen. mgr.; preceding officers, F. Ward Paine and Daniel C. Noble, directors; Horace V. Winchell, cons. engr.; Andrew J. Ray, mine supt.; F. Pratt, mill supt.; Julian Vivian, smelter supt.; Julius H. Warner and Daniel J. Williams, engrs.

Organized Oct. 14, 1905, under laws of Arizona, capitalization \$3,000,000, shares \$10 par, increased, May 11, 1909, to \$6,000,000, shares \$10 par, nonassessable; issued \$4,110,000. Has about 2,500 shareholders. State Street Trust Co., Boston, registrar; American Trust Co., Boston, transfer agent. Stock is listed on the Boston Stock Exchange. Annual meeting, first Monday in April.

The East Butte Copper Mining Co. owns all the outstanding bonds of

the Pittsmont Copper Co., all the preferred stock of the same company, amounting to \$1,000,000, par value and four-fifths of the common stock, amounting to \$4,000,000 par value. The East Butte operates the property of the Pittsmont Copper Co. under an operating agreement. On May 1, 1913, company paid off the last installment of the \$500,000 borrowed Dec., 1912, to make full payment to the Pittsmont Copper Co. The indebtedness is now \$700,000. Annual report for year ending Dec. 31, 1912, shows a net surplus on operations for year of \$983,701, compared with \$256,643 in 1911.

A few years ago the management realized that the Dutton group, the original East Butte holdings, would not make a big mine and bought the Pittsmont property, thus saving the East Butte stockholders from loss and resuscitating what threatened to be a big mining and metallurgical fizzle. Besides giving 110,000 shares of East Butte stock for this mine and smelter, which has been rebuilt, it has paid \$2,500,000 cash, all realized out of the Pittsmont mine.

The Dutton group, 134 acres, is in the southeastern part of the Butte camp, near the Pennsylvania mine. The various original properties were said to carry nearly 20 veins, of more or less promise, with 11 shafts of 50 to 1,000' depth.

The Dutton claim is a placer patent, and apparently the principal orebody is cut off by the southern side line, at depth of 900 to 1,000'. The Dutton has 2 shafts, 16x4' 6" in the clear, being the largest in Butte. No. 1 shaft, 1,300' deep, is at the extreme north, and No. 11 shaft, 500' deep, at the extreme south of the property. Considerable ore was developed on the 200', 400', 600' and 800' levels, and the mine was claimed, Sept., 1907, to have blocked out, on the 400' level and above, 597,404 tons of ore, with an estimate of 1,000,000 tons of ore of 3 to 4% copper tenor blocked out in the entire property; these figures, made by the original management, proved too high, both as to tonnage and value. The 400' level shows a 6' vein assaying up to 5% copper. The Dutton carries 3 veins having more or less commercial ore, and a long crosscut from No. 1 shaft, on the 900' level, cut the Glengarry vein, about 20' in width. The mine was flooded, after cutting the Glengarry vein, and work was suspended, Aug., 1909. In Sept., 1913, the No. 1 shaft of the mine was equipped with electric hoist and unwatered; ore was hoisted from the 400' level. The shaft will be deepened and the ground thoroughly explored.

The Pittsmont claims cover 280 acres of flat valley bottom, about 1½ miles east of Butte and extending outward from the footslopes of the continental divide mountain ridge. The ground is a filled-in valley, the sandy wash and debris being in places several hundred feet deep, so that no outcrops of any kind exist on the ground. The underlying rock is the normal Butte granite (quartz monzonite) which is cut by 3 systems of veins: Northwest, corresponding to the Blue Vein series of Butte; northeast, and an east-west fault vein series. Ore shoots occur in veins of each series.

The veins are worked by 2 shafts, Nos. 2 and 3, 1,240' and 1,500' deep, No. 1 shaft being idle. These 2 shafts are connected on the 1,200' level by a half-mile crosscut in black granite. Deeper development by a 300' winze opened up several good orebodies on the 1,500' level. Development in former years disclosed ore shoots in the Donner, Rossell and Motherill veins, all northeast fissures, and the Reed, a northwest vein. The Rossell shoot, 400' long, 1 to 11' thick, averaging 3' and mined from the 800' level down, is smelting ore. The Donner is a lean quartz pyrite vein, 1 to 12' thick, with a shoot of enargite-chalcocite ore 5 to 7' thick, 135' long and of unknown depth, averaging 5% copper and 13 oz. silver per ton. The western part of the property is developing finely. An orebody 3 to 30' wide is al-

ready developed for 1,600' in length on the 800' level and cut on the 600 and 1,200' levels. It is said to average 10% copper. Vein No. 2 also shows very rich ore at the west end of the 1,200' stope. Ore reserves are said to be as large as they were 1 year ago and the deeper development, which shows such excellent orebodies, is shallow compared with the older mines of Butte.

The old holdings of the East Butte also include the Oneida mine, which has yielded some rich ore, up to 16% in copper tenor; the Lassen mine, which also has produced a little ore carrying up to 16% copper and 10 oz. silver per ton, and the Yankee Boy mine.

The Pittsmont property, still technically owned by the Pittsmont Copper Co. and the Pittsburgh & Montana Copper Co., but operated by the East Butte, comprises 1,384 acres, of which 46 claims, area 850 acres, are in the eastern part of the Butte district. The main mine is a tract of 260 acres, lying on the flat east of Butte, including the McQueen placer and adjoining claims, formerly owned by Franklin Farrell.

Development for 1912 consisted of 7,130' of drifts and crosscuts mostly on the 1,000' level to open up veins worked on the 800' and 1,200' levels.

Ore mined amounted to 110,968 tons of a gross value of \$2,148,796, or \$19.36 per ton for the year ending June 1, 1913. This compares with 94,532 tons in 1912 and 89,888 tons in 1911, with values of \$16.51 in 1912 and \$15.31 in 1911.

Mining costs are reported as \$3.79 in 1911; \$4.31 in 1912 and \$4.84 in 1913, with smelting costs of \$5.33, \$4.91 and \$4.91 for corresponding years.

Equipment is very complete, including a 2,000-h. p. steam plant and 600-h. p. electric plant, with about 1,900 h. p. used at the mine and 700 h. p. at the mill and smelter, a 500-h. p. hoist good for 1,300' depth, and a 600-h. p. hoist good for 1,600' depth, with 25-drill Nordberg and 40-drill Rand air compressors, and 20 power drills. Electric power is used for practically all purposes except hoisting. There are about 20 buildings, including a 38x70' brick carpenter shop, frame smithy, 2 engine houses, 2 boiler houses, changing house, laboratory and office, latter having a library, reception room and café. The mine is served by the Northern Pacific railway, which makes connections at Butte with other lines, and the company has about 3 miles of private track, connecting the shafts, shops, mill and smelter, with 1 locomotive for switching. The lands, in 2 tracts, were surrounded by high board fences by the former management.

A limestone quarry, area 275 acres, bought, 1910, at Lime Spur, east of Whitehall and about 40 miles east of Butte, in Jefferson county, furnishes flux for the smelter.

The Pittsmont reduction plant is the only operating smelter in Butte and does a considerable amount of custom business, treating ore from several independent mines. The furnace building has two 250-ton blast furnaces, with room for 3 additional cupolas of the same size. A new dust chamber has increased the earnings by \$100,000 yearly and the installation of Dwight-Lloyd sintering machines, by another \$50,000 annually. The converter department has 2 stands, with 96x156" shells, and there also are 2 experimental Baggeley converters, of smaller size, not in use. Product is blister copper, averaging about 96% copper, 200 oz. silver and 3.5 oz. gold per ton, shipped to the Nichols Copper Co., New York, for refining.

The concentrator, near the smelter, is fully equipped with crushers, jigs, tables, etc., and about two-thirds of the ore produced is of concentrating grade. A precipitation plant, completed early 1909, includes a high dam around the tailings pile, and mine water is run through the tailings for enrichment before going into the leaching launders.

Improvements for 1913 include extensive changes in the reduction

plant, remodeling and rebuilding the concentrator to have a capacity of 600 tons per day, enlarging the smelter to double its former capacity and electrifying the entire plant.

Miscellaneous holdings, 634 acres, include the Swissmont mine, near Elkhorn, Jefferson county, Mont., bought for \$60,000, which shows a large body of low-grade sulphide ore, of 1.5 to 3% copper tenor. This is idle. The Chamounix mine, near Austin, Lewis & Clark county, Mont., includes the Christina group of 6 claims, and the Fannie Parnall group of 33 claims. This property has considerable development and shipped some argentiferous copper ore, but has been idle for some years. There also are mining claims at Pittsburg, 4 miles from Helena, Lewis & Clark county, Mont., little developed and idle.

The company's annual report for year ending Dec. 31, 1912, shows 99,458 tons of ore mined, averaging 5.78% copper, of which 73%, or 72,865 tons, was first-class, holding 6.98% copper and 26,593 tons milling ore containing 2.48% copper. Production of the Pittsburgh & Montana was 790,600 lbs. fine copper, 81,911 oz. silver and 1,422 oz. gold in 1905, and 4,753,500 lbs. copper in 1906. Production of the East Butte Copper Mining Co. has been as follows: 3,000,000 lbs. fine copper in 1906; 3,965,480 lbs. in 1907; 1,756,000 lbs. in 1909, and 10,362,976 lbs. in 1910; 12,167,363 lbs. copper, 396,524 oz. silver and 17,959 oz. gold in 1911; 14,709,460 lbs. copper, 370,675 oz. silver and 16,920 oz. gold in 1912. Gross value of metals produced in 1912 was \$2,841,204; profit, \$1,279,737. Cost of copper is figured by company at 9.698 cts. per lb., but this figure seems low and the cost as calculated by us is 10¼ cts. Production for Jan., 1913, was the largest in the history of the company, being 1,469,000 lbs. copper.

In the past 4 years, the company has practically paid \$3,000,000 for the Pittsmont properties out of operating earnings. In 1914, it ought to be able to pay off all floating debts and accumulate enough working capital to permit paying dividends. It is a big property, of proven worth, with prospects of deep extension of orebodies; the management is able and the company rated high from every standpoint.

EAST BUTTE EXTENSION COPPER MINING CO. MONTANA

Idle. Office of mine: 113 Hamilton St., Butte, Silver Bow Co., Mont. Chas. J. Schatzlein, pres.; Philip A. Breen, vice-pres.; Frank H. Cooney, sec. and gen. mgr.; Dr. C. E. Blackburn, treas.; preceding officers and Chas. N. Joyce, directors; A. F. Munroe, engr. Organized April 10, 1906, under laws of Arizona, capitalization \$1,000,000, shares \$1 par; issued, \$550,000. Paid, Oct. 1, 1906, a 1% dividend, amounting to \$2,486.

Lands are various fractional claims, area 4 acres, lying between the Belmont, Pennsylvania and Ground Squirrel mines of the Anaconda. On these 4 acres there are 6 shafts, deepest being the 250' two-compartment No. 6 shaft, begun 1909, with about 500' of crosscuts. The Westlake and Wall mines are said to have produced, under former ownership, about \$300,000 worth of ore. The 2-compartment No. 1 shaft is 170' deep, and the 200' No. 2 shaft shows ore assaying up to 13% copper and 1 oz. silver per ton. No. 3, formerly known as the Westlake, has a small precipitation plant. A little ore was produced, 1907, by lessees, shipments reaching 40 tons daily, with net smelter returns of \$37,360.21, yielding the company a net royalty of \$12,881.83 in 1907. Company also owns a divided one-half interest in the Centerville claim, and undivided interests as follows: one-half in Malone; eleven-sixteenths in Little Evelyn; one-sixth in Valley Forge; one-half in Gregory; one-fourth in Simon; one-eighth in Eureka First; three-fortieths in Lost Fraction, and three-fortieths in Katy T. Inactive since July 20, 1909.

EAST CANADA SMELTING CO., LTD.**QUEBEC**

Office: Sherbrooke, Province of Quebec, Canada. Mine office: Weedon, Quebec, Canada. C. E. Force, pres. and gen. mgr.; J. S. Ferguson, vice-pres. and treas.; Charles D. White, sec., and Charles H. Maxcy, directors; Leland D. Adams, mg. engr. and supt.; A. M. Baker, chemist-assayer. Organized Jan. 8, 1909, under laws of Canada. Capitalization \$1,000,000, shares \$100 par; issued, 3,000.

Company owns 375 acres in Wolf county. Ore occurs as 2 lenses in schist. Veins 4 to 18' wide, strike N. 37° E., dipping 45°, has been proven to 400' depth and carries chalcopyrite in pyrite which is mined for sulphur as well as copper. Average assays: 3.65% copper, trace lead, 0.77% zinc, 0.5 oz. silver and 20 cts. gold per ton.

Developed by 2 shafts, 100' and 350' deep, and by 4 tunnels, 530', 570', 330' and 100', with 300' of crosscutting. Underground work totals about 3,000'. Ore blocked out estimated at 30,000 tons; probable ore 150,000 tons.

Equipment includes two 70-h. p. hoists, two air compressors, machine shop, smithy and general shop on property. Company has private tramway 3½ miles long, known as Weedon Mine tram, which connects with the Quebec Central railroad.

Production 1912 was 1,957,241 lbs. fine copper, making a total of 3½ million lbs. Ore treated was 31,300 tons, averaging 3.62% copper, and mined at an average cost of \$2.12 f. o. b. Weedon. Estimated production for 1913 is 3,000,000 lbs.

Company plans new shaft and 2 new underground levels, with new head-gear and electric-driven 1,600-cu. ft. compressor, new shops and dry house in 1913.

EAST COEUR D'ALENE MINE.**MONTANA**

Address: care Walter Hughes, Haugan, Missoula Co., Mont. Property, a group of claims a few miles north of Haugan, showing a 30' vein carrying a 2' pay streak of copper ore reported to carry 8% copper and good gold values. Development by short tunnels.

EAST COLUMBUS MINING CO.**UTAH**

Office: 201 Judge Bldg., Salt Lake City, Utah. Mine office: Alta, Salt Lake Co., Utah. Tony Jacobson, pres.; A. O. Jacobson, vice-pres.; Valentine S. Snow, sec., at last accounts. Organized Nov. 28, 1908, under laws of Utah, capitalization \$500,000, shares \$1 par, assessable. Lands, 100 acres, partly patented, 16 miles from a railroad. Property, known as the Silver King mine, is opened by tunnel, with about a mile of workings, showing auriferous and argentiferous lead and copper ores, and is said to have produced, under former ownership, several hundred thousand dollars worth of ore, from shallow workings and reported to be producing 1912-13. No returns secured.

EAST SNOWSTORM MINING CO.**IDAHO**

Former office: Spokane, Wash. Mine office: Larson, Shoshone Co., Idaho. A fraud order was issued, 1911, by the postal authorities against C. E. Mitchell, promoter of this company, and also against the company. The title was changed, 1911, to "The Snowstorm Deep Mines, Ltd.," which has also been branded fraudulent. Property described Vol. X.

EAST TINTIC EL RAY MINING CO.**UTAH**

Mine near Eureka, Juab Co., Utah. No trace of operations secured and company probably defunct.

EAST YERINGTON COPPER CO.**NEVADA**

Mine near Yerington, Lyon Co., Nev., adjoining the Contact group, shows a little high-grade copper ore. No returns secured. Probably idle.

EASTERN CANANEA DEVELOPMENT CO.**MEXICO**

Mine about 18 miles northeast of Cananea, Sonora, Mex. John Martin, supt., Cananea, Sonora, Mex. Property said to show copper sulphide ore developed by shaft with drift cutting 32' of ore in which there is a winze sunk about 25' in ore, reported to average 10% copper. Property is held under lease and bond from M. L. Fay, of Duluth, Minn., who controls the Fay Cananea Copper Co., which owns the mine through the Cananea Eastern Mining Co., S. A., a Mexican corporation.

ECLIPSE-ARGO MINING CO.**MONTANA**

Address: E. G. Hoffman, sec.-treas., New Britain, Conn. Mine near Argo, Broadwater Co., Mont. Bondholders have foreclosed and in April, 1913, deeds had been given to trustee for entire property.

ECLIPSE CONS. MG. & INVESTMENT CO.**WASHINGTON**

Address: John E. Newell, supt., Silverton, Snohomish Co., Wash. O. Robert Dahl, pres., Seattle, Wash.; S. Hilmar Dahl, vice-pres.; H. M. Dahl, sec.; preceding officers, Andrew Chilberg and John E. Newell, directors. Organized 1906, under laws of Washington, capitalization \$3,000,000, shares \$1 par, nonassessable; giving \$2,000,000 in stock for the property.

Lands, 10 claims, unpatented, and a mill site, in 2 groups, including the mill and claims on the Stillaguamish river, formerly held by Copper Independent Consolidated Mining Co.

Mine has 5 tunnels, longest 1,100', on a fissure vein in slate, carrying a little copper, but mainly gold and silver values. Water power from the Stillaguamish river develops 830 h. p. by turbine. The 52x133' frame concentrator, rated at 300 tons daily capacity, has tank room for cyanide treatment.

ECLIPSE MINING CO.**IDAHO**

Idle. Letters unclaimed at former office, Mullan, Idaho. Arthur A. Hale, supt., at last accounts. Lands, 4 claims, surrounded by the Lucky Calumet, Missoula and Snowshoe mines, said to carry 2 veins, one traceable 2 miles, through the Missoula and Copper King properties, developed by a 100' tunnel.

ECONOMIC MINING & MILLING CO.**NEW MEXICO**

George Hopkins, pres. and mgr., Carrizozo, N. M.; Ed. Monroe, sec.; A. V. Swearingin, treas. Property in White mountains, 8 miles east of Carrizozo. Ore carries copper with silver and gold values in iron gangue, averaging \$12 per ton. Company sinking shaft and driving tunnel in 1912. An orebody 2,200' long said to have been found on new ground in 1911.

EDDY GOLD, SILVER & COPPER MINING CO.**ARIZONA**

Idle. Removed and left no address at Glendale, Ariz. F. L. Eddy, pres. and gen. mgr.; J. R. Aich, vice-pres.; S. P. Donnell, sec.-treas., at last accounts. Organized Aug. 22, 1902, under laws of Arizona, capitalization \$1,000,000, shares \$1 par. Lands, 10 claims, area 200 acres, also a 5-acre mill site, in the Frog Tank mountains, Old Baldy district. A 3' fissure vein in porphyry, opened by six 10' pits, a shaft of 65' and tunnels of 55' and 105', carries oxide and carbonate ores, assaying 4 to 6% copper, 12 to 60% lead, 10 to 62 oz. silver and \$5 to \$32 gold per ton.

EDISON MINING & MILLING CO.**NEW MEXICO**

Idle. Property, near Red River, Taos Co., N. M., carries auriferous and argenteriferous copper ores. Equipment includes a steam plant and 10-stamp mill.

E. & F. MINING CO.**NEVADA**

Idle. Address: care Walker Bros. Bank, Salt Lake City, Utah. Mine office: Pioche, Lincoln Co., Nev. A. C. Ellis, Sr., pres.; A. Levy, sec.; Walker Bros. Bank, treas. Organized March 17, 1902, under laws of Utah, capitalization \$100,000, shares 50 cts. par, assessable. Lands, 12 claims, 11

patented, in the Bristol and Jackrabbit districts, $1\frac{1}{2}$ miles from a railroad. Mine has a 450' incline shaft and 2 tunnels, one of 350', with several hundred feet of lateral workings. Equipment includes a 25-h. p. gasoline hoist and necessary mine buildings. Mine produced a little copper ore, with excess of iron, but has been shut down since 1907.

85 (EIGHTY-FIVE) MINING CO.

NEW MEXICO

Office: Moline, Ill. Mine P. O.: Lordsburg, Grant Co., N. M. Jas. Barclay, pres., Hot Springs, Ark.; C. H. Warner, sec.; A. P. Warner, treas.; Wm. H. Kinnon, managing director. Organized Sept. 23, 1909, under laws of New Mexico, capitalization \$1,000,000, shares \$1 par. Annual meeting, second Wednesday in December.

Company purchased the Superior mine of the Superior Mining Co. in 1912. Lands, 6 claims, in Shakspeare camp about 4 miles from Lordsburg, in the Virginia district. Property includes a mine, in rhyolite, developed by a 600' tunnel and a 300' blind shaft, with a 300' air shaft to surface. Vein is estimated by company to average 10' in width and to carry 3.5% copper, 6 oz. silver and 0.1 oz. gold per ton.

A shaft has been sunk to a depth of 570' and there is about 900' of drifting said to expose 200,000 tons of silicious ore, continuous from the surface down and carrying gold, silver and copper.

Equipment includes 100-h. p. electric motor, hoist and an 85-h. p. Fairbanks-Morse crude-oil engine, as an auxiliary, and an Aldrich electric pump. Company employs about 100 men and ships 3,000 to 4,000 tons per month to the smelter at Douglas, Ariz. Management competent and property promising.

EL CLIFF MINING CO.

NEW MEXICO

Mine P. O.: Hermosa, Sierra Co., N. M. Mine, in the Lower camp, has an 85' shaft, and about 1,200' of tunnels, showing ore carrying values mainly in silver and lead. A small smelter has a 35-ton wood-burning Partridge hot-blast furnace. Company changed management and board of directors in 1912, and present officers are unknown.

EL EDEN; COMPANIA MINERA y BENEFICIADORA. MEXICO

Idle, owing to revolution. Mine at El Eden, Zacatecas, Mex. Francisco Llamasa, pres. and gen. mgr.; Enrique Gutierrez, sec.; Luis Colina, supt. Organized 1905, and reorganized 1907, under laws of Mexico, capitalization 600,000 pesos, shares 100 pesos par. Lands, 102 hectares. Is a silver-gold property with incidental copper. Mine has 8 shafts, deepest 210', and 2 tunnels aggregating 1,120' in length, with considerable underground workings, developing ores of gold, silver, copper, lead and zinc.

The mill has 40 stamps, 2 Krupp tube mills, 6 Wilfley tables and 6 Johnson tables, and it is planned installing a cyanide plant, to treat a large amount of tailings accumulated, the dump being estimated to average 400 to 500 grams silver and 3 to 5 grams gold per metric ton.

EL GLOBO MINING & MILLING CO.

MEXICO

Mine near Nacozari, Sonora, Mex. Chas. A. Romadka, pres. and mgr.; C. P. Romadka, vice-pres.; W. S. Dixon, sec.-treas.; Rolla Romadka, supt., at last accounts. Organized 1905, under laws of Arizona, capitalization \$400,000, shares \$10 par.

Lands, 80 hectares, about 20 miles east of Nacozari, the nearest rail point. Mine has a shallow shaft and a 1,600' crosscut tunnel, cutting a vein with a back of about 1,000'. Ore values are mainly gold and silver. Equipment includes a 25-h. p. electric plant, with a 15-stamp mill having 2 Wilfley tables and a small cyanide plant.

EL MAGISTRAL COPPER CO.

MEXICO

Office: 1 Madison Ave., New York. Mine office: Choix Fuerte, Sinaloa,

Mex. H. L. McNair, pres.; Hon. C. F. Wright, vice-pres.; A. G. Nash, sec.-treas.; preceding officers, Hon. W. S. Lieb, Thos. H. Carvin, H. R. Woodward, John J. Dowdle, John P. Fiebig, John G. Whitmore and Hon. G. E. Green, directors. Organized June 15, 1906, under laws of Maine, capitalization \$1,000,000, shares \$10 par. Property is the entire capital stock of San Lucas Copper Co. No returns secured. Probably closed down owing to revolution.

EL MAYO MINES OF MEXICO, LTD.

MEXICO

Sec. and offices: A. Caillat, 6 Great Winchester St., London, E. C., England. J. K. Pollock, chairman; W. A. Landan, H. Brendon, Viscount F. de Montmorency, directors. S. G. Burn, gen. mgr.; W. W. Mitchell, mine mgr. Organized April 9, 1902, as the Mechaco (Mexico) Mining & Milling Co., Ltd., title being changed in Jan., 1910. Capital £100,000, shares 10s. par; issued 160,000.

Lands, 200 gold, silver and copper mining claims, 500 acres, known as Waterloo, Alamos district, Sonora, Mex. Not being developed owing to revolutionary disturbances in Mexico.

EL TIRO COPPER CO.

ARIZONA

Office: The American Finance & Securities Co., 5 Nassau St., New York. Mine office: El Tiro, Pinal Co., Ariz. Edward B. Kurtz, vice-pres.; Wm. J. Smith, sec.; C. J. Schlaechter, treas.; W. H. Buehman, acting gen. mgr.; preceding officers, G. W. Barnes, William Greif, L. O. Bailey, H. D. Moore, C. D. Bouton, directors. Organized May 22, 1907; under laws of Arizona, as successor of the Cleveland-Arizona Mining Co., capitalization \$4,500,000, shares \$10 par; fully issued. Funded debt outstanding May 31, 1913, \$1,034,500 (authorized \$1,500,000) first mortgage 6% 10-year \$500 and \$1,000 gold coupon bonds. Dividends 6% per year until all bonds are retired. Company controlled by American Finance & Securities Co., through ownership of majority of stock issue. Annual meeting, third Thursday in April, at Tucson, Ariz.

Property, 14 claims, 255 acres, including a 5-acre mill site in the Silver Bell district, adjoining the Imperial mine, 70 miles west of Tucson. Claims show contact deposits between quartz porphyry and limestone, carrying cuprite, melaconite, chalcocite and chalcopyrite with a gangue of decomposed porphyry and limestone. Two orebodies under development are irregular in shape, of about 10 acres in combined area and proven to depth of 400'.

The mine has several shafts, including the 200' Daisy shaft, 120' Burtis shaft and the 283' three-compartment Kurtz shaft, and a 432' transportation tunnel connecting the Kurtz shaft with the railroad. There are other tunnels of 750', 350', 250' and 200', the mine having about 6,000' of workings, estimated to block out 270,000 tons of concentrating sulphide ore. Mine is said to have considerable 3% ore on the dumps.

Equipment includes a 600-h. p. steam plant, 150-kw. electric plant and a 120-h. p. gasoline plant, with a 16x20" 250-h. p. double-drum hoist, good for 1,000'; 3 gasoline hoists, and Nordberg and Sullivan air compressors of 18 drills aggregate capacity. There are 18 buildings in all.

A 50-ton concentrator, built for experimental purposes, and increased later to 100 tons daily capacity, is equipped with a 7x10" Blake crusher, 30-ton Huntington mill, 2 rolls, a Vezin automatic sampler, 1 vanner, 5 Wilfley tables and 1 Richards pulsator and hydraulic sizer. Extraction of better than 75% of assay values is reported.

EL TRIUNFO CONSOLIDATED MINING CO.

MEXICO

Office: 115 Broadway, New York. Mine office: Bacoachi, Arizpe, Sonora, Mex. A. C. Charlot, pres. and gen. mgr.; Dr. S. Newton Leo, vice-

pres.; A. L. King, treas.; preceding officers, T. B. Johnstone, Albert Reine-man, Julius G. Miller, Henry Stern, Wm. H. Freystadt, I. Neuberger, A. H. Wand, D. Powdermaker, Dr. Moritz Gross, Adolph Oltmann and John H. Brown, directors; John Martin, supt. Organized under laws of Arizona, capitalization \$2,000,000, shares \$1 par. Property is held through a Mexican corporation having a capitalization of 10,000 pesos, shares 100 pesos par, entire stock issue of which is owned by El Triunfo. Annual meeting, first Monday in October.

Lands, 55 pertenencias, area 136 acres, in 12 different groups, principal property, about 4 miles from the Picacho mines, lying about 8 miles south-west of Bacoachi, 2 miles from the Sonora river and about 75 miles by wagon road from Cananea. Properties carry 5 orebodies, under develop-ment, of 2 to 5' average claimed width, said to be traceable 2 miles, and said to carry argentiferous azurite, malachite, bornite, chalcopryite and chrysocolla, all silicious, and occasional native silver, with a claimed average value of 5% copper, 25 to 600 oz. silver and \$3 gold per ton.

The mines were said, 1910, to have about 7,000' of workings, main shaft being 400' deep, connecting with a tunnel, for extraction. There are 5 shafts, 6 tunnels and various open cuts. The main vein is a fissure of 4 to 5' width, and practically vertical dip, carrying oxidized ores to shallow depth, suc-ceeded by sulphides.

Equipment includes a 90-h. p. steam plant at the mine, and a small saw mill, with 26 buildings. Wells provide water for boilers and potable use.

A 50-ton mill has a 25-h. p. steam engine and 4 Behrend tables, with a 3-mile pipe line to the Sonora river, where there is a small pumping station. In 1912 a 50-ton wood-burning reverberatory furnace was installed.

Smelter was blown in in 1908, but only made intermittent runs of a few days, though said to have worked well; was blown in again in 1911. Trans- portation facilities are poor, nearest railroad station being at Cos, 38 miles distant by mule trail.

Company paid a dividend of 1% in Aug., 1911. During 1912, company operated its smelter (reverberatory), shipping matte to El Paso, running \$625 per ton. Closed down in 1913 on account of unsettled political con- ditions and insecurity of property rights during revolution.

EL VAN COPPER CO., S. A.

MEXICO

Mine near Nacozari, Sonora, Mex. R. I. Van Dusen, pres. and gen. mgr.; Fritz Kohlmeyer, supt. Organized under laws of Mexico. Mine, about 3 miles from the Pilares, and 12 miles from Nacozari, carries streaks of rich ore, of about 10% copper tenor, and is said to have considerable concentrating ore carrying 3 to 4% copper. Mine has 4 tunnels. Company inactive, property not operated for several years and several claims for- feited to government for non-payment of taxes.

ELDORADO GOLD MINING & MILLING CO.

UTAH

Office: 549 25th St., Ogden, Utah. Mine near Hot Springs, Box Elder Co., Utah. Don Maguire, mgr., at last accounts. Ores said to carry copper, silver and lead. No returns secured.

ELECTRIC MINING & SMELTING CO.

OREGON

Mine at Idanha, Marion Co., Ore., in the foothills of the Cascade range, said to show chalcopryite and bornite ore, associated with pyrite with high values in free gold. Property controlled by Hugh Freeland, through ownership of 85% of the capital stock. No trace of operations secured.

ELENITA DEVELOPMENT CO.

MEXICO

Office: 1400 Alworth Bldg., Duluth, Minn. Operating office: Warren, Cochise Co., Ariz. Former mine office: Cananea, Sonora, Mex. Louis W. Powell, pres. and gen. mgr.; E. J. Maney, vice-pres.; F. R. Kennedy, sec.;

Henry B. Paull, treas., and Thos. F. Cole, directors. Capitalization, originally \$200,000, was increased, 1907, to \$400,000, shares \$10 par; paid in, \$5. Property is the entire stock issue of the Lomita Mining Co., S. A., a Mexican corporation that holds direct title to the lands.

Property, the Bonanza de Cobre, at Cananea, purchased from company of that name.

The Bonanza de Cobre mine, 1,628 acres, lies north of the smelter and extends to a point nearly opposite the Puertecitos mines of the Greene Cananea. Development is by 2 shafts and 5 tunnels, mine being wet at slight depth and giving, as far as developed, mainly silver-lead and zinc ores with a little copper. Company abandoned its San Felipe property in March, 1913.

ELEPHANT HEAD MINING & MILLING CO.

ARIZONA

Address: Ben Daniels, pres., Nogales, Ariz. Copper-lead property near Mt. Hopkins, Santa Cruz Co., Ariz. Organized 1910. Lands are about 40 miles from Tucson, and 6 miles from the Calabasas railroad, near Elephant Head Butte, in the Santa Rita mountains. A vein, said to have a 40' outcrop, carries a complex of argentiferous lead, copper and zinc sulphides, of low average grade, and there also is a 20' vein of quartzite, said to give surface assays of \$10 gold per ton. Reported to be working a force of 25 men in May, 1913, and to have struck good ore in tunnel.

ELIZABETH GOLD HILL MINING CO.

WASHINGTON

Office and mine: North Yakima, Yakima Co., Wash. L. L. Matterson, pres.; P. J. Eschbach, vice-pres.; Frank X. Nagler, sec.-treas.; preceding officers, Jos. Feser, Thos. Hope, E. P. Sanford and Rudolph Mayer, directors. Organized 1900, under laws of Washington, capitalization \$1,000,000, shares \$1 par, nonassessable. Annual meeting, second Monday in March.

Lands, 14 claims, unpatented, area 200 acres, adjoining the Blue Bell mine on the north, about 65 miles northwest of North Yakima, in the Summit district. Property shows a number of orebodies in granite, 4, of 7 to 15' reported width, carrying auriferous and argentiferous lead and copper ores, with 1,600' of workings, estimated by management to show 150,000 tons of ore, with 100,000 tons blocked out for stoping, averaging \$40 per ton, which figures are excessive.

Equipment includes steam and water power, and a small saw mill, with material for a 10-stamp mill on the ground. Idle.

ELK MOUNTAIN MINING CO.

NEVADA

Idle. Letters neither returned nor answered from former office, Boise, Idaho. Mine office: Three Creek, Owyhee Co., Idaho. M. S. Estes, pres. and gen. mgr.; Neil Beaton, vice-pres.; C. W. Robinett, sec.-treas., at last accounts. Capitalization, \$500,000, shares \$1 par. Lands, 5 claims, in Elko county, Nev., 8 miles from the Idaho line, about 16 miles northwest of Contact, Nev., and connected therewith by a good wagon road. Has a 14' contact vein, between limestone and granite, of silicious sulphide ore, said by company to average 6% copper, 7 oz. silver and 0.04 oz. gold per ton, apparently from a paystreak, opened by a 40' tunnel.

ELK MOUNTAIN MINING & MILLING CO.

WYOMING

Letters unclaimed at former office: Encampment, Carbon Co., Wyo. J. B. Tillou, pres. and gen. mgr.; E. E. Hanna, vice-pres.; S. E. Phelps, sec.-treas.; preceding officers, M. L. Phelps, F. S. Bash, G. B. Gunnison and E. W. Silver, directors. Organized 1900, under laws of Wyoming, capitalization \$1,000,000, shares \$1 par.

Lands, 640 acres, patented, 200 acres of which are well timbered, on

Elk mountain, in the Medicine Bow range. Property carries contact deposits between limestone and schist, opened by an 80' tunnel and 3 shafts, deepest 200', showing a vein up to 20' estimated width, carrying chalcocite in the upper workings, succeeded by chalcopyrite, estimated to average 2 to 4% copper. Test shipments of 15 tons of ore, to the Encampment smelter, some years ago, gave returns of 13% copper. Has steam and electric power and necessary buildings. In Nov., 1911, secretary reported \$33 in the treasury, no debts or bonds. Property idle.

ELKHART MINE.**WYOMING**

Owned by Walcott Copper Mining Co.

ELKHORN COPPER MINING CO.**WYOMING**

Idle several years. Letter returned unclaimed from former mine office, Encampment, Carbon Co., Wyo. Ray Campbell, gen. mgr.; W. W. Petty, supt., at last accounts. Lands, on Elk mountain, carry a 7' vein of sulphide ore, giving assays of 6 to 20%, and claimed, June, 1910, to average 7 to 8% copper, with considerable ore in sight. Mine has a shaft and a 460' tunnel.

ELKHORN GOLD & COPPER MINING CO.**UTAH**

Mine near Ogden, Weber Co., Utah. S. W. Cragun, pres.; Moroni S. Poulter, vice-pres.; Walter J. Hoyt, sec.-treas.; preceding officers, F. E. Kinman, Willey Cragun and J. W. F. Volker, directors. Organized Nov. 9, 1907, under laws of Utah, capitalization \$50,000, shares 10 cts. par, non-assessable; issued, \$26,500. Annual meeting, third Wednesday in March.

Lands, 8 claims, unpatented, area 160 acres, in the Sierra Madre district, 10 miles north of Ogden, showing granite, quartzite and limestone, with 7 orebodies, 1, under development, reported by company as of 11' average width, and traceable 2,100', carrying cuprite, chalcopyrite and bornite, having 50', 65' and 145' tunnels. Management planned continuing 65' No. 3 tunnel, and adding an air compressor. No returns secured.

ELKHORN MINING CO., LTD.**BRITISH COLUMBIA**

Mine P. O.: Greenwood, Boundary district, B. C. Jas. Sutherland, pres. and gen. mgr., at last accounts. Mine under development, 1910, has auriferous and argentiferous lead and copper ores.

ELKHORN MINING CO.**MONTANA**

Office: Butte, Mont. Mine P. O.: Elkhorn, Jefferson Co., Mont. C. C. Largey, pres.; H. H. Frank, sec.; J. E. Higgins, gen. mgr.; C. L. Gluyas, supt.; R. G. Zimmer, mg. engr.; H. F. Edwards, chemist-assayer. Organized Jan. 15, 1913, under laws of Montana, capitalization \$1,000,000, shares \$1 par, nonassessable; issued 250,000. Properly formerly belonged to Golden Curry Consolidated Mining Co.

Lands, 9 claims, 162 acres, in Elkhorn district, Mont. Orebody shows oxidized iron cap, lying between limestone and granite and dipping at 45°. Property said to show 5 orebodies, 2 now being developed. Principal ore shoot has a width of 30', length of 295' and a proven depth of 180'. Ore contains chalcopyrite and tenorite in oxidized iron ore, the average contents being: 1.9% copper, 4 oz. silver and 0.35 oz. gold per ton, with 48% excess iron.

Development by 2 shallow shafts and 4 tunnels of 680', 400', 230' and 80'; total underground work said to be 8,200'. Ore blocked out estimated at 20,000 tons; probable ore 100,000 tons. Average cost of mining \$2.20, smelting charges \$2.10. Production 1912, 150,000 lbs. of copper from 8,000 tons of ore averaging 0.98% copper. Management plans 1,250' tunnel cutting ore at 450' depth in 1913. Geology and history of property given in Bull. No. 527, U. S. Geol. Surv., "Helena Mining Region," by Adolph Knopf, pp. 136 to 139.

ELLAMAR MINING CO.**ALASKA**

Office: 211 American Bank Bldg., Seattle, Wash. Mine office: Ellamar, Prince William sound, Alaska. F. M. Jordan, pres.-treas.; C. S. Pack-er, sec.; L. L. Middlekamp, supt.; preceding officers, W. R. Rust and Chas. de Steigure, directors. Organized 1900, under laws of Washington, capi-talization \$10,000,000, shares \$100 par. Is reported to have paid over \$300,-000 in dividends. Property changed ownership April, 1909.

Lands, 14 claims, patented, known as the Ellamar mine, on Virgin bay, 28 miles south of Valdez. The mine has a 600' three-compartment vertical shaft, with levels at 100' intervals, and has about 2 miles of workings, said to block out about 250,000 tons of ore for stoping.

Ore occurs in a lens 80x200' and lies wholly within the slate, pinching out 30' below the 500' level. Ore is mainly chalcopyrite associated with pyrite, pyrrhotite and sphalerite in a gangue of slate, graywacke and quartz, assaying from 3 to 25% copper, 3 oz. silver and up to \$50 gold. Mine was the first copper producer in Alaska, beginning shipments in 1901. Some diamond drilling was done, 1909-1910, on surface; 2,000' done in 1912. A coffer dam has been built to permit mining orebody outcropping on the beach, below the ocean level.

Equipment includes a 300-h. p. steam plant, with 3 boilers, a 3-drill Ingersoll-Rand air compressor, Nordberg compressor, a 12x24 Nordberg engine and a 60-h. p. hoist. Buildings include a machine shop, smithy, lab-oratory, mess house and 12 other buildings. A 40x150' wharf has 2,000-ton ore bunkers, about 250' from the main shaft.

Costs are said to be about \$3 per ton, for ore loaded on vessels, with about \$3 transportation charges to the Tacoma smelter. Production, for 6 years ending 1908, said to have been about 80,000 tons of ore. Property considered valuable.

Production: 1911, over 16,000 tons, averaging 0.24 oz. gold, 0.80 oz. silver and 6% copper; 1912, 22,000 tons, averaging 0.30 ozs. gold, 0.90 oz. silver and 2½% copper.

ELLISTON COPPER MINING CO.**MONTANA**

Letters neither returned nor answered from office at Elliston, Powell Co., Mont. J. J. Delaney, pres.; J. E. Shattuck, vice-pres.; Allan McNaugh-ton, sec. and mgr., at last accounts. Organized Oct. 12, 1908, under laws of Montana, capitalization \$500,000, shares \$1 par.

Owens the Flagstaff mine, with 4 claims, and a fractional interest in 6 additional claims, in the Snowshoe district, 11 miles northwest of Elliston. Mine shows a deposit of ore in limestone, that is claimed to be 70' wide, giving assays of 5 to 70% copper and \$10 per ton in combined gold and silver values, obviously from selected samples. Development by several tunnels from 200 to 400' long. Shipments to Tacoma smelter have returned 21.35% copper and 2.66 oz. silver per ton with traces of gold.

ELM ORLU MINING CO.**MONTANA**

Office: Miner Block, Butte, Mont. Hon. W. A. Clark and W. A. Clark, Jr., owners. J. W. Pyle, cons. engr.; H. C. Mangum, agt. Or-ganized 1907, capitalization \$1,000,000, shares \$1 par. Statement filed with assessor of Silver Bow county, June, 1913, showed assets, \$143,823 and debts, \$80,000.

Company owns the Elm Orлу mine and the claim of that name ad-joining the Butte & Superior holdings, the Badger State mine of the Ana-conda Copper Co. and the Pilot Butte mine, all in the northeast section of the Butte district. The Poser claim is owned by a separate company.

The Elm Orлу covers part of the Rainbow lode and several other veins containing large bodies of copper ore and immense bodies of zinc ore. The

copper occurs as copper glance, both in secondary fault veins and in veins of the Rainbow lode, and also as chalcopyrite mixed with zinc ore. The mine has a 1,400' shaft and several miles of workings, principally below the 900' level.

The report of the company filed with the county assessor June, 1912, showed 47,194 tons, yielding \$10.19 per ton, as compared with 87,793 tons mined in 1911, yielding \$8.15 per ton. Cost of mining is given as \$6.14 and of smelting at \$2.34.

The output of the mine, 1914, will be handled in a new 250-ton mill in course of erection by the Timber Butte Milling Co., also owned by Senator and W. A. Clark, Jr.; the zinc concentrates of this mill will go to the National Zinc Co.'s plants at Bartlesville, Okla., Kansas City and Springfield, Ill. The copper ore is shipped direct to the Anaconda smelter, the mine yielding from 50 to 100 tons a day during 1913.

The Minerals Separation Co.'s process of concentration by froth flotation will be installed at the new concentrator, as a year's very thorough tests of this process made in competition with practically all other methods has shown it to give the best results.

ELM RIVER COPPER CO.

MICHIGAN

Office: 70 State St., Boston, Mass. Mine near Winona, Houghton Co., Mich. Company dissolved and now in process of liquidation. Final dividend of 19 cts. per share now being paid to stockholders. Property has been acquired by Contact Copper Co., which see.

ELY AMALGAMATED COPPER CO.

NEVADA

Company controlled since 1911 by Jesse Knight, pres., Provo, Utah, who owns 51% interest. Mine office: McGill, White Pine Co., Nev. Organized 1907, under laws of Utah, capitalization \$100,000, shares 10 cts. par. Is no relation to the other company of same title.

Lands, 6 claims, and a townsite, about 1 mile from the Steptoe smelter, of the Nevada Consolidated Copper Co., at McGill, carries silver-lead ores, and several carloads of ore have been shipped. Mr. Knight is developing the property.

ELY ARCH COPPER CO.

NEVADA

Mine near Ely, White Pine Co., Nev. Fred L. Small, pres.; F. M. Lee and Oscar J. Smith, vice-pres.; J. B. O'Sullivan, sec.; D. P. Bartley, supt., at last accounts. Nixon National Bank, treas. Organized March, 1907, under laws of South Dakota, capitalization \$5,000,000, shares \$5 par; issued, \$3,200,000. Company patented 110 acres near Ely, Nev., in 1912.

ELY BELL MINING CO.

NEVADA & UTAH

Letters unclaimed at former mine office, Ely, White Pine Co., Nev., and Salt Lake City, Utah. F. O. McFall, pres. and gen. mgr.; W. T. Binford, vice-pres.; J. E. Hanway, sec.-treas. Organized April, 1907, under laws of Arizona, capitalization \$1,000,000, shares \$1 par.

Lands formerly were 3 claims unpatented, in the Ely district, and 15 claims, area 300 acres, in the Draper district, adjoining the Little Cottonwood district of Salt Lake county, Utah, held under bond and lease, said to show a 12' vein.

Company was "merged," 1908, in the Corona Consolidated Mines Co., but the consolidation, not proving a success, individual shareholders of the Ely Bell were requested, early 1910, to send in their certificates, inasmuch as the property was lost, through foreclosure, on account of non-performance of assessment work, and was relocated, 1908, the Ely Bell Mining Co., is merely a shell, and its stock utterly worthless, unless new property be secured.

ELY-CALUMET COPPER CO.**NEVADA**

Office and mine: Ely, White Pine Co., Nev. Al. D. Myers, pres.; J. K. Turner, sec.-treas. and gen. mgr.; preceding officers, G. L. (Tex.) Rickard and Thos. Rockwell, directors. Organized under laws of Nevada, capitalization \$5,000,000, shares \$5 par. A stock control is said to be under option to Thos. F. Cole and associates. Stock is listed on the Salt Lake Stock Exchange.

Property consists of 32 claims, unpatented, 600 acres, said to have cost \$75,000, about a mile north of Ely, at the extreme eastern end of the known copper belt. Claims cover a high hill of limestone, traversed by E.-W. fault veins of ferruginous quartz, much crushed and brecciated, with replacement bodies of ironstone carrying copper. Mine has a 450' two-compartment shaft, and 500' of tunnels, with about a quarter-mile of workings, showing a 4' vein carrying auriferous and argentiferous chalcocite. Management was said to plan sinking the shaft to 1,000' and drifting at 100' intervals. Several sets of lessees, working on the Wildcat and adjoining claims, have shipped a little ore, one shipment, 1910, by Strelke Bros., returning 42.6% copper and 3 oz. silver per ton. Sunday shaft in limestone cut lead ore at 120', passed into ironstone, 40', carrying 2½% copper. Property leased, 1913.

ELY CONSOLIDATED COPPER CO.**NEVADA**

Office: 414 Judge Bldg., Salt Lake City, Utah. Mine: Ruth, via Ely, White Pine Co., Nev., and Elko, Nev. S. M. Levy, pres. and gen. mgr.; Gideon Snyder, sec.-treas.; Grant Snyder and Daniel B. Shields, directors; R. M. Kellogg, supt. Organized Oct. 2, 1906, under laws of Utah, capitalization \$10,000,000, shares \$10 par, of which 300,000 shares were donated to treasury by incorporators. Last assessment 5 cts. per share, levied Nov. 13, 1912, delinquent Feb. 28, 1913. Stock is listed on the Salt Lake Stock Exchange and the New York curb. Registrar and transfer agent, United States Corporation Co., 34 Nassau St., New York.

Property consists of 3 groups, 1 in the Ely district, also a lease and bond on the Copper Queen mine, Elko, Nev., and the Baltimore, an adjoining property.

The Ely property consists of a group of 15 claims, about 300 acres, on the south side of the mineral belt, near the Ruth and Jupiter groups of the Nevada Consolidated, bought for about \$100,000. The group has 3 vertical shafts, and, during the first 5 months of 1910, made 1,348' of new openings. The 625' Brilliant shaft has silver-lead ore on the 400' level, and near the bottom is said to show a 100' bed of disseminated copper ore, below commercial grade. The American shaft was 500' deep, at last accounts.

Principal development in recent years has been at the 800' Zack shaft in the western end of the group. Orebody on 500' level reported to be 100' wide with 2 to 6% copper and \$1 to \$4 gold and silver, with another vein 5' wide averaging 3.8% copper and \$1 gold-silver. From 500 to 700' levels, ore flattened, being 264' further south on the 6th than on the 5th level. Ore consists of bunches of copper glance with some oxide and carbonate in white clayey gouge and decomposed rock. Crosscut on 700' cuts monzonite, but too deep for pay ore.

The company's report for 11 months ending Sept. 30, 1911, showed general expenses \$42,690, mine development \$130,603, surface improvements \$34,082. Annual report for 1912 shows \$51,459 spent for mining machinery with a cash balance on hand of \$15,000.

After an expensive campaign of development at the Ely-Nevada property, it was realized that the property could not be put on a paying basis

under existing conditions and the policy of the company was changed and new properties sought. In March, 1913, the Copper Queen mine, near Elko, Nev., was purchased, for \$50,000. In May the Peterson group in Pine Valley was bonded and in June the property of the Pacific Consolidated Mining & Smelting Co., near the Copper Queen, was taken over on \$30,000 bond and lease.

The Copper Queen group consists of 18 claims in the Merrimac district, 22 miles northwest of Elko, Nev. Property shows a gossan outcrop, 500x600', carrying 40 to 50% iron; also 2 veins, one of them traceable a mile, showing surface exposures of shipping ore. Work was begun on this property in March, 1913, and shipments in May and June averaged 100 tons per week, smelter returns showing 7.4% copper, 7.9 oz. silver per ton, 40 cts. gold, 28% iron and about 35% silica. The ore is hauled by automobile trucks.

The Baltimore group, 12 claims, 6 patented, includes the Cuag and Morgan mines, taken under bond June, 1913, on 15% royalty with no cash payment until 1914, appears to be a valuable acquisition. The Cuag workings contain ore blocked out and the shaft has been enlarged, re-timbered and is now reported to show high-grade bornite ore. The Morgan mine shows 2' of 12% ore and recent shipments have carried from 3 to 10% copper, a varying percentage of lead and 12 to 15 oz. silver.

The Peterson group, also bonded in 1913, is located at Lone mountain, midway between Elko and Tuscarora, 8 miles from Hale Crossing, a station on the railroad with which it is connected by good wagon road. Property shows veins with oreshoot carrying high-grade copper ore and old workings carry 5% copper ore from which shipments were being made. The Pacific Consolidated Mining and Smelting Co. property, also held under lease and bond, consisted of a 300-acre group of claims on which shipping ore was also found.

This company is fortunate in having a practical business man looking after its affairs and it seems now to be operated on safe lines. For several years past, extravagant statements concerning the company were issued by brokers and misleading assays were published of the value of the ore developed in the Zack shaft. It is now known that the orebody is low grade and cannot be profitably mined. Assessments have been levied and stockholders' spirits kept up by optimistic statements. The company has a large capitalization but the new management and new properties appear likely to bring the property to a self-supporting, if not a profitable basis.

ELY COPPER CO.

NEVADA

Office: 815 Ernest & Cranmer Bldg., Denver, Colo. No representative at Ely, White Pine Co., Nev. Geo. F. Fry, pres.; Frank P. Berchy, vice-pres.; R. J. Grant, sec.; E. C. Newcomb, treas.; preceding officers and F. J. Shipman, directors, at last accounts. Organized Sept., 1906, under laws of Wyoming, capitalization \$5,000,000, shares \$5 par.

Lands, 8 claims, 2 fractional, area 125 acres, in limestone area, lying northwest of the Giroux Consolidated. Mine has some open cuts, and a shaft, reported by company as 405' deep, with a 25-h. p. hoist. Stock was placed by the General Finance Co. of Denver, on a 25% commission. Is not regarded favorably. Idle, since 1907, but planned sinking shaft near east boundary of group in 1912.

ELY GIROUX COPPER CO.

NEVADA

P. O. Kimberly, White Pine Co., Nev. Windsor Trust Co., of New York City, trustee. Company incorporated, 1909, by B. W. Coleman, Graham F. Putnam, and Roswell S. Nichols. Capitalization \$5,000,000, shares \$5 par. In Nov., 1912, majority holdings were pooled, and \$75,000 shares

treasury stock offered public, proceeds to be handled by Windsor Trust Co. as trustee, exclusively for payment of contractors sinking shaft on company's property at Ely, Nev.

ELY HIDDEN TREASURE CONS. MINING CO.

NEVADA

Idle. Office: Carson City, Nev. Mine office: Ely, White Pine Co., Nev. W. J. Harris, pres.; D. C. McDonald, vice-pres. and gen. mgr.; Geo. T. Mills, sec.; Eugene Howell, treas. Organized Jan. 5, 1907, under laws of Nevada, capitalization \$1,500,000, shares \$1 par, nonassessable.

Lands, 6 claims, patented, area 63 acres, covering monzonite-limestone contact, lying between the Federal Ely, Chainman and Nevada Consolidated properties, carrying irregular replacement orebodies in limestone and deposits in porphyry. Shows 4 mineral outcrops, 4 to 20' long, having silver-bearing lead and copper ores.

Mine has shafts of 115', 75', 40', 60' and 102', and tunnels of 400', 110' and 68', with about 1,000' of workings. Produced a small tonnage of silver-lead ore in 1909.

ELY MAJESTIC COPPER CO.

NEVADA

Letter returned from Ely, White Pine Co., Nev. Lands, about 9 miles north of Ely, carry a vein of about 20" width, slightly developed, ore assaying 7 to 9% copper. Idle for several years and presumably dead.

ELY-MIZPAH COPPER CO.

NEVADA

Idle. Letters unclaimed at former mine office, 10 Ely Trust Bldg., Ely, White Pine Co., Nev., and Denver, Colo. Geo. D. Wilson, pres.; Jas. D. Conway, vice-pres.; A. M. Kearns, sec., at last accounts. Organized June 28, 1907, under laws of Arizona, capitalization, \$2,000,000, shares \$1 par. Lands, 7 claims, 140 acres, known as the Modoc group, near the Vulcan-Ely, 4 miles southeast of Ely. Management claimed, 1911, to have done necessary assessment work. Probably closed down.

ELY NATIONAL COPPER CO.

NEVADA

Idle. Mine near Ely, White Pine Co., Nev. Max Straus, pres.; Hon. Jas. B. Grant, vice-pres.; Edw. B. Morgan, sec.; Thos. Keeley, treas.; G. L. Rickard, resident mgr.; John D. Murphy, mine mgr., at last accounts. Organized 1907, as successor of the Ely Jumbo, Mizpah Verde and Anaconda companies, capitalization \$5,000,000, shares \$2.50 par; issued, \$3,750,000. Advertised delinquent for taxes, 1913.

Lands, 24 claims, patented area 480 acres, including the Cowen group of 4 claims, adjoining the Nevada Consolidated on the south, property being located southwest of the Nevada Consolidated, and immediately south of the Manhattan & Ely Copper Co.

ELY-NEVADA COPPER CO.

NEVADA

Idle. Address: care Hamilton H. Durand, 60 Wall St., New York. Mine near Ely, White Pine Co., Nev. Volney D. Williamson, pres.; F. L. Underwood, vice-pres.; Chester S. Bonham, second vice-pres. and sec.; R. H. Eggleston, asst. treas.; preceding officers; G. L. Rickard, E. A. Davidson and J. Markham Marshall, directors. Organized May 17, 1906, under laws of Maine, capitalization \$1,000,000, shares \$1 par. Lands, 9 claims, area 170 acres, near the Cumberland-Ely, considered fairly located.

ELY REVENUE COPPER CO.

NEVADA

Idle. Office: Denver, Colo. Mine near Ely, White Pine Co., Nev. C. E. McConnell, pres. Organized Jan., 1907, capitalization \$1,000,000, shares \$1 par. Lands, known as the Revenue group, are near the Chainman and Altman mines.

ELY SILVER LEAD COPPER CO.

NEVADA

Idle. R. L. Bixby, sec., Union, Hardin Co., Iowa. Nearest P. O.: Ely, White Pine Co., Nev. H. J. Benson, pres.; F. K. Long vice-pres.; H. H.

Barnes, treas.; preceding officers, J. D. Cundiff, H. Cundiff and R. Baverder, all of Union, Iowa, formed directorate at last accounts; C. R. Fuller, gen. mgr. Organized Nov. 21, 1908, under laws of Nevada, capitalization \$1,500,000, shares \$1 par, nonassessable, in \$500,000 preferred and \$1,000,000 common stock; issued, \$500,000.

Property, the Tamerlane mine, in Tamerlane district, Schell Creek range, across Steptoe valley from Ely, was a small silver-led producer, many years ago. Surface shows quartzite dikes of 450' and 600' estimated width, separated by about 500' of limestone, with a porphyry cross-dike. Mine has a 360' tunnel, planned to be driven 1,200' with a number of shallow pits. Selected samples have assayed up to 27% copper with good silver values. The company states that \$250,000 of silver ore was mined, 1880-84, just above the tunnel now being driven.

ELY STAR MINING CO.

NEVADA

Office: Columbus, Ga. Litter unclaimed at former mine office, Cherry Creek, White Pine Co., Nev. J. F. Weathers, pres.; W. S. Anderson, vice-pres.; A. C. Chancellor, sec.-treas., at last accounts. Capitalization \$1,000,000, shares \$1 par. Lands, 3 claims, known as the Black Metal group, and a mill site, in Silver canyon, about 5 miles north of Cherry Creek, developed by a 195' shaft and a 675' tunnel. Probably closed down.

ELY VALLEY MINING & MILLING CO.

NEVADA

Office: Pioche, Lincoln Co., Nev. George Weddell, pres.; W. E. Harrison, vice-pres.; Edward Thomarson, sec.-treas. and gen. mgr.; C. L. Warren, supt.; James W. Abbott, mgr. engr. Organized Jan. 6, 1908, under laws of Nevada, capitalization \$1,000,000, shares \$1 par, fully paid and nonassessable; 600,000 promotion stock and 400,000 treasury; 10.196 issued. Annual meeting, second Tuesday in May.

Property, 200 acres, 16 claims, part patented and balance held by location, in Ely mining district, Lincoln Co., Nev. Ore occurs in vertical contact veins between limestone and quartzite. Vein reported to be 7' wide, to strike northwest and to be proven to a depth of 500'. A vein of 10% copper ore was cut in shaft at 480' depth. Average assays, 1911, were 20% lead, 20 oz. silver and \$2 gold per ton.

Developed by 4 shafts, 500', 80', 50' and 60' and a tunnel 400' long. Planned sinking shaft to 750' level, 1911, and crosscutting to the north, east and west fissures. Equipment includes gasoline hoist, air compressor, pump and air-circulating plant. S. P. L. A. & S. L. R. R., $2\frac{1}{2}$ miles from property.

ELY VERDI COPPER CO.

NEVADA

Geo. Wingfield, pres., care Goldfield Consolidated Co., Goldfield, Nev. Mine P. O.: Ruth, via Ely, Nev. S. R. Roberts, John Berry, of Ely; A. P. Sawyer and Leslie L. Savage, of Goldfield; M. R. Brown and H. S. Anderson, of Pierre, S. D., directors. Organized May, 1912, under laws of South Dakota, capitalization \$5,000,000, shares \$5 par. Is a reorganization of company of same name that was listed on New York curb in 1909.

Property consists of a large group of claims south of the Copper Flat steam-shovel pit of the Nevada Consolidated. Only assessment work being done in 1912.

ELY WITCH COPPER CO.

NEVADA

Idle. Mine near Ely, Nev. J. E. Bamberger, pres., 161 Main St., Salt Lake City, Utah.; D. M. Hyman, vice-pres.; J. L. Tilton, sec.; Ernest Bamberger, treas. and gen. mgr.; preceding officers and W. W. Armstrong, directors. Organized Nov. 22, 1906, under laws of Maine, capitalization \$5,000,000, shares \$5 par.

Lands, 7 claims, 1 fractional, area 54 acres, patented, bought for \$275,-

000, lying in the porphyry zone between the Ruth and Cumberland-Ely mines of the Nevada Consolidated, showing large blowouts of iron-stained porphyry. Development by a 300' shaft, with levels at 100' intervals, and by tunnels of 1,200', 600' and 1,050', with 3,500' of workings. Development of property was disappointing, for, while claims cover the main monzonite belt of the district, the underground work on 300' level showed values too low to work. Drilling by Nevada Consolidated Co. is the logical thing to do and that company can probably work this property since it is now handling 1.6% ore at a profit. Company was a speculative promotion at time Nevada Consolidated was floated, and proving lean on development, has been idle since.

EMERALD MINING CO.

UTAH

Office: Salt Lake City, Utah. Mine office: Mammoth, Juab Co., Utah. W. E. Earles, pres.; H. C. Hoffman, vice-pres.; J. E. Oglesby, sec.-treas.; J. L. Yundt, gen. mgr.; preceding officers and E. E. Hoffman, directors. Organized 1896, under laws of Utah, capitalization \$300,000, shares \$1 par, assessable, fully issued; last assessment one-half cent a share, delinquent Dec. 15, 1913. Is a silver-lead property, with incidental copper, like most Tintic properties. Lands, 4 claims, and additional property was bought, 1910. Mine has 1,100' shaft, with about 4,000' of workings, on a narrow but rich vein, carrying auriferous and argentiferous copper and lead ores.

In May, 1913, it was reported that 22' of ore cut on the 2000' level of the Opex mine extended into this property. In July, 1913, company started a drift on the 1,100' level to be driven 1,200' north, to open up the ore formerly worked on the 2,000' Opex, the latter company having withdrawn permission to use the workings.

Company has levied assessments for years and been regarded as the "wildest of wildcats," but is now in favor, and may repay stockholders for their blind faith and yearly contributions. Company filed suit Aug., 1913, against the Centennial Eureka Mining Co., for \$100,000 damages for alleged wrongful extraction of 2,000 tons of ore from Emerald lode.

EMERALD MINING CO.

WYOMING

Idle. Office and mine: Wheatland, Laramie Co., Wyo. Lands include the Cooney Hill mine, formerly owned by the Cooney Hill Gold & Copper Mining & Milling Co., and the Emerald mine, on Slate creek, the properties showing a prominent gossan outcrop in schist. The Emerald has a 60' shaft in ore, and a 100' shaft bottomed in a gossan showing traces of copper sulphides. No recent report received.

EMMA COPPER CO.

UTAH

Idle, save for leasers' work. Office: care W. J. Bateman, sec., Salt Lake City, Utah. Owns Emma mine at Alta, Salt Lake Co., Utah. Is a silver-lead, not copper producer. Last assessment one-half cent a share, delinquent Sept. 19, 1913. See Vol. X.

EMMA H. MINE.

COLORADO

Address: Major H. Stephens Ehrman, owner, Pitkin, Colo. Mine on South Gold hill, Siegel mountain, above timber line, in Quartz Creek mining district, Gunnison Co., Colo., 3 miles north of Pitkin. District shows fissure veins in Paleozoic sediments underlain by pre-Cambrian schists. The mine is a recent discovery with a 25' shaft showing 2' paystreak of solid chalcopryrite and galena in a 6' vein of milling ore. Owner plans driving 2 tunnels and shipping ore by auto trucks this winter.

EMMA MINE.

BRITISH COLUMBIA

Owned and worked by British Columbia Copper Co.

EMMA MINE.

MONTANA

Idle. Owned by Butte Copper & Zinc Co., at Butte, Mont.

EMMA MINE.

S. L. Landon, supt. Mine at Fierro, Grant Co., N. M. Owned by Phelps, Dodge & Co. Property under development, 1913, at the 400' main shaft, where heavy flow of water and thin mud has hindered operations. Employs 25 men. Mine is operated by the Copper Queen Consolidated Mining Co.

EMPIRE COPPER CO.**IDAHO**

Address: care Wm. A. Kerr, sec.-treas., 111 Broadway, New York. Mine address: Mackay, Custer Co., Idaho. Frank M. Leland, pres., gen. mgr. and purch. agt.; Ralph R. Osborn, vice-pres.; Stanford Leland, cons. engr. and chemist-assayer. Organized June 6, 1907, under laws of Maine, capitalization \$6,000,000, shares \$5 par, reduced, July 16, 1908, to \$1,200,000, shares \$1 par; issued \$1,000,000. Stock listed on the New York curb. Annual meeting, third Tuesday in May. Equitable Trust Co., New York City, registrar; Corporation Trust Co. of N. J., transfer agt.

Company bought the Mackay property of the White Knob Copper & Development Co., Ltd., taking over also a 5-year lease on the property from the MacBeth Lease, Inc., giving 250,000 shares of stock to the White Knob and 750,000 shares to the MacBeth, and began business without any cash in the treasury, but with 200,000 shares of stock.

The property consists of the White Knob Copper mine, 3 miles south of Mackay, on Salmon river branch of the Oregon Short Line, with 39 claims, 6 fractional, 6 patented, 700 acres, also mill and smelter sites of 480 acres, and a railroad right-of-way, in the Alder Creek district, Custer county, Idaho. Property carries a large number of lenticular contact deposits, in granite-porphry between limestone and granite. The property is remarkable for its peculiar ore deposits. These are cylindrical, pipe-like masses of a branching, treelike form, found in garnetized altered porphyry lying between limestone and granite. The geology has been carefully studied and is described by Kemp in the Transactions Am. Inst. of Mg. Eng., 1907. The ore is largely a cupriferous pyrite with much chrysocolla derived from its alteration. The average assay of the 26,200 tons of ore mined in 1912 was 5.8% copper, 3 oz. silver per ton and \$1.36 gold per ton.

The mine was opened 1884, and worked at various times. For years it was controlled by a succession of White Knob corporations, each making a failure of the mine, until the property was leased, July 1, 1905, to the MacBeth Lease, Inc., which worked the mine on a business basis, at a profit, something the old owners never succeeded in doing.

The mine has a glory hole of 125 to 200' width, but mining is mainly by tunnel, the 700' main shaft connecting with the Albert tunnel, 1,500' long, the mine having about 6 miles of workings, estimated to show 20,000 tons of ore, blocked out for stoping. The mine is dry.

Equipment includes steam, electric, gasoline, water and air power, with a total of 152 h. p. at the mine and 125 h. p. at the smelter. There are 6 small hoists and 2 and 5-drill air compressors. Buildings include about 20 structures, with a saw mill, carpenter shop and smithy, there being a 40x100' machine shop at the smelter.

The mine is reached by a 96-mile branch of the Oregon Short Line railway, running from Blackfoot to Houston, and is connected with the smelter by the 7¾-mile Empire railroad, owned by the company, of 36" gauge, equipped with two 23-ton Shay mountain-climbing locomotives and 33 cars. The line has a maximum gradient of 6%, with a rise of 2,000', and has one 6% grade on a 34° curve.

The smelter has two 125-ton water-jacket blast furnaces, 44x160" at

the tuyeres, with Connersville blowers, making matte carrying about 40% copper, 26 oz. silver and 1 oz. gold per ton, sent to the Murray smelter for conversion, and treating 100 cars of ore in Aug., 1913.

The Empire Copper Co. was promoted just in time to be caught in the 1907 panic, but every share of stock sold to the public was redeemed, at subscription price, for which the promoters deserve credit. The property is considered valuable, notwithstanding its bad record under the various White Knob companies. While the mine proper was idle from 1907 to 1911, some of the outlying properties were leased and shipments from these leases were made, to the Garfield smelter. Production, 1906, was 3,200,000 lbs. fine copper, under the old management; 2,750,000 lbs., in 1907; 834,000 lbs., in 1910, and 26,200 tons of ore, yielding 3,000,000 lbs. copper, in 1912. Present management good, Mr. Leland having made the property pay from the time he took hold of it.

EMPIRE COPPER CO.

NEW MEXICO

Idle. Mine near Santa Rita, Grant Co., N. M. Geo. O. Hilzinger, pres. and treas.; John Asheroft, vice-pres.; F. C. Knolnberg, sec., at last accounts. Organized July, 1909. Lands, 14 claims, near the Chino, previously worked under bond and lease by the Columbia Copper Co. No trace of operations secured.

EMPIRE COPPER SYNDICATE, LTD.

BRITISH COLUMBIA

Liquidated voluntarily in Dec., 1912. Formerly at Rainy Hollow, Atlin division, Cassiar district, B. C. Described Vol. VIII.

EMPIRE COPPER & GOLD MINING CO.

ARIZONA

Office: 510 Bradbury Bldg., Los Angeles, Cal. Mine address: Dragoon, Cochise Co., Ariz. P. E. Johnson, pres. and treas.; Seth Merrill, vice-pres. and gen. mgr.; Chas. R. Van Tilburgh, sec.; preceding officers, M. J. Gress, H. Hermanson, N. J. Nordquist and L. V. Shaw, directors. Organized Jan. 31, 1905, under laws of Arizona, capitalization \$1,500,000, shares \$1 par, non-assessable; issued 950,014. Annual meeting, second Monday in January.

The company owns 3 separate groups of claims, all near Johnson and Dragoon, 2 stations on the Southern Pacific railway in Cochise county, Ariz. The Empire group, on which all the company's work has been concentrated for some years past, consists of 16 claims, 2 miles southeast of Johnson. The ground shows limestones and quartzite cut by porphyry and traversed by N. W. fissures carrying ore. Principal development is on the Empire group, which has the 380' Empire 2-compartment incline shaft, with about 500' of drifts, so wet that it was abandoned, temporarily; also the 125' Bridge, 158' Copper Whale and a 2,000' tunnel-shaft started. Mine shows auriferous and argentiferous copper ore.

In May, 1913, the machinery and supplies were moved from the Empire group 6 miles south to the Princess group, where development work will be prosecuted in the future. These claims have attractive surface showings of iron gossan and copper carbonate and have heretofore been opened only by shallow shafts, the deepest 160'. The company also owns the Cowboy group of 8 claims, also partly developed and having veins in limestone near porphyry contacts.

Equipment includes a 25-h. p. hoist and 1-drill Fairbanks & Morse air compressor. Buildings include an engine house, 14x16' smithy, bunk house and boarding house. The company has moved the hoist to the Princess group and plans to deepen the old Bridge shaft to 500'. A "strike" of rich ore made early in 1913, said to average 30% copper, will be developed and shipments made in 1913-14. The S. P. railroad is said to cross the Princess group.

EMPIRE MINING CO.**MEXICO**

Address: Dolores Mining & Development Co., P. O. Box 533, Sta. L., Oakland, Cal. Mine address: care Ben Bound, supt., Cananea, Sonora, Mex. Company is the Mexican holding company of the Dolores Mining & Development Co. Capitalization 10,000 pesos. Owns 95 hectares, 30 in the Cananeas, including the Major Domo copper mine, a few miles from Cananea. A 200' shaft is reported to show a northeast-southwest vein, 2½ to 3' wide. In a drift on the 100' level, the paystreak averaging about 18" wide, carries about 30% copper, 80 oz. silver and 2 oz. gold per ton. Company also owns the Dolores, Empire, Bonanza, Spanish, Golden Cross and Providencia, silver-gold properties, amounting to 65 hectares, in the Magdalena district, Sonora, Mex. Plans erecting a 3-unit Pittman mill at the Golden Cross property, 14 miles southwest of Cananea.

EMPIRE MINING & DEVELOPMENT CO.**ARIZONA**

This company endeavored unsuccessfully to reopen and find a new ore-body in the Total Wreck mine, 9 miles south of Pantano, Pima Co., Ariz., and has therefore paid its debts and gone out of business. Described Vol. X.

EMPIRE-NEVADA COPPER MINING & SMELTING CO. NEVADA

Office: 42 Broadway, New York. Mine: Yerington, Nev. Wm. Gelder, pres.; G. B. Garrison, sec. Organized under laws of Arizona, capitalization \$5,000,000, shares \$5 par.

Owns about 500 acres on Copper Flat in 2 groups; 1 about 1 mile west of Yerington, Nev., the other 2½ miles northwest of Yerington. Ore occurs in bunches and disseminated throughout a body of monzonite-porphry, said to be opened for 3,000' long and 1,000' wide, carrying copper in the form of silicates, carbonates and oxides, a considerable part of it averaging 2.65% copper.

Development by 5 shafts, from 80 to 160' in depth and by several tunnels and open cuts and also by drilling, but had just reached water level in July. Mine is said to have produced about \$150,000 from surface workings, shipped 6,000 tons of 6% ore to Mason Valley smelter, 1912, and is now making monthly shipments of from 500 to 600 tons of ore to the Mason Valley smelter at Thompson, Nev. Property has small smelting plant, assay office, hoist, boarding house, etc.

EMPIRE STATE MINING CO.**ARIZONA**

Office, Utica, N. Y. Mine office: Bisbee, Cochise Co., Ariz. R. E. King, pres.; F. L. Guillaume, vice-pres. and treas.; E. M. Penny, sec.; W. A. Fenn, Geo. P. Langford, John A. Losee, John A. Urchel, directors; John A. Collins, gen. mgr. and purch. agt.; O. P. Zane, cons. engr. and supt. Organized June 27, 1904, under laws of Arizona, capitalization \$1,000,000, shares \$1 par. Annual meeting in June.

Lands, 11 claims, area 230 acres, near the Modern mine, about 9 miles northwest of Bisbee, having a 1,000' tunnel, said to show about 150' of low-grade copper ore, slightly auriferous and argentiferous, estimated to average about \$8 per ton in values, and formerly claimed to average \$14 per ton. Ore is found in small stringers, typical of the district, and property is not considered well located. Development by a 1,300' tunnel.

EMPIRE ZINC CO.**ARIZONA**

Owns San Xavier group of claims in Pima district, 20 miles south of Tucson, Ariz. Claims show copper ores, but company was working silver-gold veins, employing about 40 men and shipping 40 tons daily; June, 1913.

ENAVILLE SMELTER.**IDAHO**

Owned by North Fork Smelting & Mining Co., at Enaville, Shoshone Co., Idaho.

ENGELS COPPER MINING CO.**CALIFORNIA**

Office: 823 Foxcroft Bldg., 68 Post St., San Francisco, Cal. Mine office: Lights Canyon, via Taylorsville, Plumas Co., Cal. Henry Engels, pres.; Landon A. Bell, sec.-treas.; preceding officers, Richard Spreckels, I. J. Truman, Jr., and F. Klamp, directors. Lands, 2 groups, 2 miles apart, well timbered, on Iron Cap mountain, being the Superior group, near Taylorsville, and the Engels group, 12 miles north of Taylorsville and about 20 miles by good wagon road from Keddie, the nearest railway station on the Western Pacific line.

The Engel group, at 5,000' elevation, is in Sec. 3, 4 and 9 of T. 27 N., R. 11 E. The "copper belt" is 1,800' wide at this place and the gossan outcrop 300' across and 2,000' long, running northeast and dipping west. Orebody is a huge lens, lying in porphyry alongside of a diorite dike and well adapted for development by tunnel. Underground workings, made in the past 5 years, amount to 4,108' and prove ore for 250' in depth with upraise of 150' and shaft of 80'. The ore is a mixture of chalcopryite and bornite with barite and altered country rock and is said to average from 2 to 14%, but it is not believed that the whole deposit will average over 4%. Company claims 70,000 tons carbonate ore and 350,000 tons chalcopryite and bornite ore blocked out, this estimate probably being based on the assumption that the whole deposit is minable above the tunnel level. Fifteen thousand tons of bornite ore are reported on the dump, ready for smelting.

The Superior group of 8 claims, area 164.8 acres, is located 2 miles southwest of the Engel group. The ore deposit is like that of the other group in both character and occurrence and is said to be 200' wide, to run north and south, and dip 65° W. Development is meagre, being only a 400' tunnel and 60' shaft, but said to show 10,000 tons of ore on the dump and 25,000 in mine.

The smelter will be blown in when a process for eliminating sulphur fumes is perfected. The ore gives a 95% recovery by froth flotation process and a mill of this kind will be erected. Work for past 2 years has been centered on development, but property expected to become a producer within the next year.

Improvements consist of 1½ miles rope tram way, steam power plant, 5-drill air compressor, 110-ton smelter, brickyard, sawmill and all necessary buildings.

ENSLEY GIANT MINING & DEVELOPMENT CO.**ARIZONA**

Idle many years. Office: 1712 Ave. F, Ensley, Ala. Letter unclaimed at mine office, Florence, Pinal Co., Ariz. W. L. Clark, pres.; John Angwine, vice-pres.; Walker Ward, sec.; J. F. Echols, treas.; R. T. McCloud, chairman; Jas. Merriman, gen. mgr., at last accounts. Organized May, 1908, under laws of Arizona, capitalization \$16,500, shares \$50 par. Lands, 420 acres, known as the Durham group.

ENTERPRIZE MG., REDUCTION & IMPROVEMENT CO. ARIZONA

Idle. Last address: Kingman, Mohave Co., Ariz. Maj. W. A. Mensch, pres. and gen. mgr.; J. N. Turrentine, sec., at last accounts. Organized July 15, 1900, under laws of Arizona, capitalization \$1,500,000, shares \$1 par. Annual meeting, first Tuesday after first Monday in January.

Lands, 15 claims, area 300 acres, in the Maynard district of the Hualapai mountains, adjoining the Arizona Le Roy Copper Mining Co., 30 miles southeast of Kingman and about 13 miles from the Santa Fé railway, with a good wagon road connecting, lands well watered. Property shows 7 orebodies, in granite and porphyry, the American vein, being estimated at 30' average width, opened by a 300' shaft, with 1,410' of workings, estimated to show 70,000 tons of ore, with 40,000 tons blocked out, carrying

bornite, chalcopyrite and tetrahedrite, averaging 7% copper, 25% lead and 206 oz. silver, and from \$4 to \$8 gold per ton, which estimates are high. Has a 35-h. p. steam plant, with 8 mine buildings. No returns secured.

EQUATOR MINING & SMELTING CO.

ARIZONA

Idle. Office: 20 Exchange Place, New York, N. Y. Mine office: Jerome, Yavapai Co., Ariz. Hon. Wm. A. Clark, pres.; Jas. A. Macdonald, vice-pres.; Harry H. St. Clair, sec.-treas.; preceding officers, Chas. W. Clark and Jas. H. Anderson, directors. Organized March 19, 1900, under laws of West Virginia, capitalization \$500,000, shares \$5 par; issued, \$250,000. Annual meeting, third Monday in February.

Property, the Iron King mine, on Equator hill, in the Agua Fria district, is 4 miles by trail, or 6 miles by wagon road, south of Jerome. Property shows a mineralized zone up to 600' in width, with north and south strike, traceable for upwards of 1,000'. It was feared that the orebody was a blanket vein, but diamond-drill borings proved it to hold to depth, carrying auriferous and argentiferous copper ores. Mine has a 300' main shaft, and a 5,000' gravity tram line, connecting the portal of the upper tunnel with the roast yard of the reduction plant.

There was a 250-ton smelter, and production, 1904, was 800,000 lbs. fine copper, but operations were suspended Aug., 1905, smelter dismantled and machinery removed.

EQUITY COPPER & GOLD MINING CO.

OREGON

Office: Rev. W. J. Hughes, pres. and gen. mgr., 2441 Center St., Baker City, Ore. Mine P. O.: Prairie City, Grant Co., Ore. F. M. Saxton, vice-pres.; Mrs. Kate Palmer, sec.; G. J. Bowman, treas.; preceding officers, Hon. T. E. Johns and Rev. R. W. Hughes, directors. Organized 1901, under laws of Oregon, capitalization \$150,000, shares 10 cts, par, non-assessable. Paid a dividend of \$3,000.

Lands, 16 claims, unpatented, 320 acres, with a 5-acre mill site, in the Quartzburg district, 7 miles north of Prairie City, reported to show 11 orebodies, with 3, under development, traceable one-half mile, developed by tunnels, showing sulphide ore estimated by company to average 2 to 3% copper, 2% lead, 2% zinc, 4 oz. silver and \$18 gold per ton.

The 80x120' frame mill has 5 stamps, a 9x12" Blake crusher, New Standard tables and 3 slime-tables. Presumably idle.

ERIE MINING CO.

UTAH

Idle. Mine at Newhouse, Beaver Co., Utah. G. D. Anson, sec. Organized Jan. 14, 1910, under laws of Utah, capitalization \$60,000, shares 10 cts. par.

Lands, 10 claims, adjoining the Utah Gold & Copper Co. on the north, in the Washington district of the Needle range. Mine, on which work was begun 1910, has a 50' two-compartment shaft, and a 100' drift tunnel on No. 3 vein, showing streaks of ore carrying copper, lead and zinc sulphides. A copper vein is shown on the surface. See Vol. X.

ESMERALDA COPPER CO.

MEXICO.

Has no representative at former mine office: Llano, Magdalena, Sonora, Mex. F. C. Emery, pres.; W. D. Fredericks, mgr., at last accounts. Lands, 88 hectares, said to have surface outcrops of ore assaying 10 to 25% copper, 15 to 20 oz. silver and \$6 to \$20 gold per ton, undoubtedly from selected samples. Mine, on which work was begun Jan., 1907, has about 300' of workings, showing argentiferous copper ore, with silver said to increase at depth.

ESMERALDA COPPER MINING & SMELTING CO.

MEXICO

Idle. Mine near Santa Catarina del Norte, Baja California, Mex. Fred

W. Burns, supt., at last accounts. Mine, known as La Esmeralda, is opened by shaft, with considerable development.

ESMERALDA; NEGOCIACIÓN MINERA.

MEXICO

Idle. Mine at Chalchihuites, Sombrerete, Zacatecas, Mex. Property includes the Anaconda, Esmeralda and La Luz mines, developed by shafts and tunnels, carrying argentiferous and auriferous lead and copper ores.

ESPERANZA COPPER CO.

ARIZONA

Idle. Mine near Twin Buttes, Pima Co., Ariz. Capitalization \$600,000, shares \$1 par. Lands, 6 claims, area 90 acres, in the Cañada del Oro district of the Sierrita mountains. Mine, with about 1,000' of workings, was worked formerly for silver, copper sulphides coming in at depth of 100'. Workings above 100' depth carry lead, copper and zinc sulphides. Has steam power, and shipped about 200 tons of ore, of good grade, in 1909. No returns secured.

ESPERANZA MINING CO.

MEXICO

Sec. and office: E. W. Nicholson, 801 Land Title Bldg., Philadelphia, Pa. Operating office: P. O. Box CCC, San Diego Cal. Mine near Ensenada, Baja California, Mex. Geo. P. Brown, gen. mgr.

Lands, 83 hectares, and 40 acres miscellaneous lands, on Cedros island, on the Pacific coast. Country rock is diorite, with veins having 3 lenticular ore shoots carrying carbonate and sulphide ores, estimated by company to average 40' width, 300' depth and 1,100' length, and to contain an average of 2.5% copper, 3% zinc, 2 oz. silver and \$3.50 gold per ton. Mine has been extensively developed, having about 8,500' of workings, showing 150,000 tons of low-grade ore, with about 100,000 tons blocked out for stoping, surface gold ores changing to basic copper ores at depth. Property has produced about \$450,000 in values, from shipments of high-grade ores to the Denver, Pueblo, San Francisco and Tacoma smelters. Extensive development being done in opening up and blocking out ore, in 1913.

ESPERANZAS MINING CO.

MEXICO

Idle. Mine at Estación Symón, San Juan de Guadalupe, Durango, Mex. Joseph Steel, gen. mgr., at last accounts. Capitalization \$200,000. Property includes the Montaña de Cobre, Esperanza and other claims.

ESQUER y CA; ALEXANDER.

MEXICO

Idle. Mine at Baroyeca, Alamos, Sonora, Mex. J. J. Esquer, mgr., at last accounts. Property, the Mexicana, Esperanza and other mines, developed by shafts and tunnels, carrying auriferous and argentiferous copper ores.

ESTELLE MINING CO.

CALIFORNIA

Office: 320 So. Main St., Los Angeles, Cal. H. C. Troger, superintendent, Keeler, Inyo Co., Cal. Property, the Morning Star group of claims, shows a fissure vein carrying complex lead-copper ore with gold-silver values. Development is by a 500' shaft and a 4,400' tunnel. Company actively developing with 25 men at last report. Equipment includes gas-line power and air compressor.

EUREKA COPPER MINES, LTD.

BRITISH COLUMBIA

Office and mine: Nelson Kootenay district, B. C. J. J. Malone, pres.; A. B. Ritchie, vice-pres.; L. B. Reynolds, sec.-treas. Organized March 2, 1906, under laws of British Columbia capitalization \$250,000, shares 25 cts. par, nonassessable; issued, \$231,250. - Property under bond and lease to B. C. Copper Co., Ltd.

Lands, 7 claims, 2 fractional, all except 1 crown granted, approximately 250 acres. Situated 2½ miles from the Canadian Pacific railway, and about 9 miles westerly from Nelson. Property contains several veins, partly along contacts between limestone and granite, and partly along fracture planes in the granite. But one of these veins is being developed,

this vein varying from a few inches to 15' or more in width, with an average of about 3', and traceable along the surface for several thousand feet. It is developed by shaft, winzes, raises and a 900' crosscut tunnel, the main development being along the 270' level of the shaft. Deepest working is 375' beneath collar of shaft.

On the 270', or crosscut tunnel level, the vein is developed for nearly 1,000'. Above the tunnel level the ore for the most part consists of copper carbonates contained in a lime-silica gangue, with more or less alteration products of granite. Below the tunnel level the ore, where explored, carries copper as chalcopryite, bornite, chalcocite and tetrahedrite. Considerable native silver accompanied the secondary copper sulphides. Copper contents of ore shipped average 5%, 1 to 100 oz. silver per ton and 50 cts. to \$10 gold per ton.

The mine is equipped with hoisting and steam-compressor plant, but will later be provided with an electric-driven mining plant, and an aerial tramway to the railway, the latter now on hand ready to be erected. An average of 25 men are employed. The ore will be shipped to the Greenwood smelter of the B. C. Copper Company, 110 miles to the west.

EUREKA EXPLORATION CO.

COLORADO

Idle. Office: 217 Magoun Bldg., Sioux City, Iowa. Mine at Eureka, San Juan Co., Colo. Theodore Ivens, mgr., at last accounts. Property, known as the Ridgeway group, carries lead and copper ores, developed by tunnels. Has steam and water power, an air compressor, 10-stamp mill and a small concentrator. No returns secured.

EUREKA GOLD & COPPER MINING CO.

ARIZONA

Mine office: Jerome, Yavapai Co., Ariz. Dr. A. J. Murietta, pres.; A. A. Macpherson, sec.-treas.. Lands, 8 claims, 7 miles south of Jerome, near the Iron King mine, opened by 2 tunnels, showing a 30' vein with an 8' paystreak carrying auriferous bornite and chalcopryite, with occasional visible gold, but has not developed ore in commercial quantities. Mainly idle, for some years, excepting necessary annual assessment work.

EUREKA HILL MINING CO.

UTAH

Office: Deseret National Bank Bldg., Salt Lake City, Utah. Mine office: Eureka, Juab Co., Utah. Moylan C. Fox, pres.; Geo. W. Riter, sec., managing engr. and supt. Organized Nov. 12, 1875, under laws of Utah, capitalization \$1,000,000, shares \$100 par. Is a close corporation, and has paid considerable dividends, but accounts are not published. Annual meeting, third Tuesday in February.

Lands, 3 claims, area 27 acres, patented, also a 25-acre mill site and 100 acres miscellaneous lands, in the Tintic district. The Eureka Hill mine, extensively developed, has a 1,500' main working shaft and about 30 miles of workings. Orebodies are lenticular deposits, carrying cuprite, malachite and enargite, with average values of about 1.4% copper, 6% lead, 25 oz. silver and \$3 gold per ton. Mine worked for 45 years but shut down, 1911, and only old workings mined by leasers since then. Produced many millions of silver-lead ore from above 1,000' level. Deep development in future will be from adjacent mines. Adjoins Bullion-Beck and Centennial Eureka. Leasers working through latter ground, 1912, marketed many carloads of very high-grade ore.

Production, formerly treated at the mill, has been shipped to smelters in Salt Lake valley, since 1904, and is mainly silver-lead ore. Latest reported copper production was 134,000 lbs., and presumably is now trivial.

EUREKA MINES CO. CONSOLIDATED.

NEW MEXICO

Property sold to Jarilla Consolidated Copper Co., Dec., 1912. Was fully described Vol. X.

EUREKA MINING, SMELTING & POWER CO.**OREGON**

Idle. Office: P. O. Box 53, Clarkston, Wash. Mine office: Imnaha, Wallowa Co., Ore. W. E. Howard, sec. Lands, 40 claims, patents applied for, but secretary reports, 1913, property idle for several years, awaiting railway facilities.

EUREKA OPHIR MINE.**UTAH**

At Dry Canyon camp, via Stockton, in Rush Valley district, Tooele Co., Utah, on the S. P. L. A. & S. L. R. R. Property shows veins with replacement orebodies in Paleozoic limestones at and near dike contact and is shipping 50 tons a month from the 200' and 375' levels, averaging 8% copper, 15 oz. silver, 10% lead.

EUSTIS MINING CO.**QUEBEC**

Mine office: Eustis, Sherbrooke Co., P. Q., Canada. W. E. C. Eustis, 131 State St., Boston, Mass., pres., sec.-treas.; L. M. Adsit, supt. Organized 1878, under laws of Quebec, and operated as a close corporation.

Lands, near Sherbrooke, carry 4 parallel interbedded lenses of cupriferous pyrite, in talcose schist crossed by diorite dikes, the cupriferous belt being traceable for 2 miles. The orebody is worked through an inclined shaft to a depth of about 3,450' on the incline, with an average dip of 45°. Lenses are 3 to 60' in width, averaging about 2.5% copper, up to 60 cts. per ton in combined gold and silver values, and 40% sulphur, but with considerable variations, ore occasionally carrying up to 50% sulphur. Footwall vein, or lens 4 to 20' thick, 50 to 100' long. Main vein 20 to 60' thick, 100 to 120' long. Shaft vein, 3 to 15' thick, 50 to 100' long. No. 1 vein 2 to 25' thick, 20 to 120' long. Footwall and shaft lenses richest in copper, averaging 4 to 8%, while others carry 2½% copper with 42 to 48% sulphur. Property is primarily a producer of pyrite, for the sulphuric acid trade.

The mine, opened 1870, and producing for 30 years, has a 7x7' crosscut tunnel, 1,000' in length and a shaft of 3,000', sunk at 20 to 45°, with double skip tracks. The mine is dry, most of the water coming from surface and the upper stopes, but the limited quantity of mine water is very acid, and contains copper in solution, which is precipitated as cement copper on scrap iron as it leaves the tunnel, through which it is conducted by a launder. Mine is served by the Boston & Maine railway. About 150 men are employed in the mine and mill.

There is a 400 kw. hydro-electric power plant on the Coaticook river, 2 miles from the mine. The main plant has 2 alternators mounted on the same shaft and run in parallel, driven by turbine water wheels. There is one 150 and one 200-kw. generators, direct-connected to the water wheels running at 500 r. p. m. The power is generated at 2,200 volts. The electric efficiency is 90 to 93% and efficiency of water wheels is 60 to 80%, according to load.

Equipment includes a 150-h. p. Westinghouse electric hoist, with 6' drums, raising 8-ton loads, good for 3,500' depth. There are two 8-drill 2-stage Rand air compressors, 1 run by steam and 1 by electricity.

The 200-ton mill, three-fourths mile from the mine, is connected therewith by an electric tram, equipped with three 3-ton cars. The mill has a 150-h. p. electric equipment. Ore is dumped onto grizzlies, coarse ore falling to the sorting floors and conveyor belts, where hand-picked and cobbled. Ore sufficiently rich for shipping is reduced to 2½" size, and concentrated ore is reduced to ⅛" size, by crushers and 3 sets of rolls, going thence to a 6-compartment classifier, which sends each size to one of 8 Wilfley tables, middlings from the tables being sent back through the classifiers.

Selected ore and concentrates are shipped to various acid works, and

there burned for sulphur, the cupriferous cinder remaining then being shipped to the Norfolk smelter, where treated for copper. Production is about 30,000 tons of cupriferous pyrite yearly, and copper production is estimated at 1,500,000 lbs. for 1912.

EVA MAY MINE.**MONTANA**

Near Basin, Mont. Owned by the Montana Mineral Land Development Co.

EVALENE MINE.**ARIZONA**

B. F. Daniels, owner, Helvetia, Pinal Co., Ariz. Alvan D. Dailey, supt. Is a copper mine developed by shaft and tunnels, employing about 15 men and equipped with gasoline hoist.

EVANGELINA COPPER MINING CO.**MEXICO**

Idle. Mine near Santa Catarina del Norte, comprises 150 acres, carrying a fissure vein of 3 to 6' width. Has steam power.

EVANSTON MINING CO.**MEXICO**

Idle. Mine near Gabriel, San Juan del Rio, Durango, Mex. J. B. Davis, mgr.; F. Boland, supt., at last accounts. Property, known as La Purisima group, carries auriferous copper and argentiferous lead ores.

EVERGREEN BLUFF MINING CO.**MICHIGAN**

In liquidation. Property owned by Mass Consolidated Copper Co.

EVERGREEN GOLD & COPPER MINES CO.**COLORADO**

Office: 205 Empire Bldg., Denver, Colo. Mine office: Apex, Gilpin Co., Colo. J. S. Tapp, pres.; Geo. E. Bell, vice-pres.; Wm. C. Hollister, sec.-treas.; Etienne A. Ritter, gen. mgr.; Shad Reid, supt. Organized March 8, 1904, under laws of Colorado, capitalization \$500,000, shares \$1 par, nonassessable.

Property comprises the Evergreen mine with 6 claims, 3 patented, area 33 acres, also a 10-acre placer claim, and a quarter-acre mill site, in the Pine Creek district.

The property shows Archæan gneiss and crystalline schists, cut by pegmatite, with an eruptive rock called "evergreenite." This dike is 3 to 12' in width, bounded on either side by ore-bearing contact zones of about 50 to 80' width. The ore deposit is unusual, carrying secondary (?) bornite as chief constituent. Development is by tunnel and 350' shaft with levels at 100', 150', 200' and 350'. Two ore shoots were found on the 100' level, 1 on the 200' and a new one south of this on the 350' level. Main orebody is 15 to 18' thick, consisting of heavy sulphides, bornite with some copper pyrite and covellite. Recent development all on 350' level. There are 4 known ore shoots, carrying chalcopyrite, bornite and covellite, estimated by management to average 3.5% copper, 2 to 8 oz. silver and 50 cts. to \$4 gold per ton. The upper workings show some malachite and tetrahedrite. Carload shipments, 1905, gave returns of 31% copper and 24 oz. silver per ton from first-grade ores, and 15% copper and 12 oz. silver from second grade ores.

Equipment includes steam power, with a 45-h. p. hoist and 4-drill Leyner air compressor. A 60-ton mill has one 9x15" Blake crusher, 2 sets of rolls, 1 Richards classifier and 2 Card tables, making a concentrate containing 26% copper, 0.15 oz. gold and 4 oz. silver per ton, the tailings carrying 0.75% copper, being a saving of \$80 of the assay value of the ore.

Management good and property promising.

EXCELSIOR MINING CO.**IDAHO**

Idle. Mine office: Burke, Shoshone Co., Idaho. Chas. Chriswell, supt. Lands, 6 claims, carrying a 15' vein showing, at surface, copper carbonates and galena. Development is by 2 tunnels, upper 150', and lower planned to be driven 625'. Employed 5 men, at last accounts.

EXCELSIOR MINING & DEVELOPMENT CO. NEW MEXICO

Idle. Mine near Orogrande, Otero Co., N. M. Lands include the Nashville and Three Friends claims, said to carry a 4' vein of 4% silver-copper ore, also lead carbonate up to 50% in tenor.

EXCELSIOR MINING, MILLING & ELECTRIC CO. COLORADO

Office: 401 Continental Bldg., Denver, Colo. Mine address: Edw. F. Bonnel, superintendent, Frisco, Summit Co., Colo. Property, the Excelsior mine with 2,600' tunnel, developing a vein carrying lead-copper ore, with gold-silver values. Equipment includes Leyner compressor driven by water and electric power. Has a 50-ton concentrator mill.

EXCELSIOR MOUNTAIN COPPER CO. NEVADA

Mine office: Hawthorne, Mineral Co., Nev. Frank D. Qualey, pres. and gen. mgr.; J. H. Suits, sec.-treas.; George Brodigan, W. R. Jackman, W. B. Tait, directors; George O. Brown, supt. Organized June, 1905, under laws of Arizona, capitalization \$1,000,000, shares \$1 par. Annual meeting June 7. Lands, 13 claims, area 260 acres, in process of patenting, 16 miles southeast of Hawthorne, in Whiskey Flat district, Mineral county, Nev., giving promising surface showings of copper for a distance of several thousand feet along a contact between granite and limestone. Has 4 shallow shafts and 2 tunnels, with one 1,500' tunnel showing ore averaging 4% copper and \$2 gold per ton. Total of underground workings about 3,000' said to prove ore to a depth of 600'.

Equipment includes 50-h. p. gasoline engine and 6-drill compressor, which will be replaced this year by electric power. Development planned for 1913 includes a connection between No. 1 and No. 2 tunnels with shaft No. 1 which, with stope development, will, it is hoped, block out sufficient tonnage to warrant building 18 miles of railroad to connect with the Southern Pacific railroad at Sodaville.

EXPECTATIVA MINING CO. MEXICO

Idle. Former address: care of W. R. Ramsdell, mgr., Guadalajara, Jal., Mex. Mine near Ameca, Jalisco, Mex. Lands, 10 miles southwest of Ameca, show auriferous and argentiferous copper and lead ores, assaying up to 27% copper.

EXPLORATION CO. OF ENGLAND & MEXICO, LTD. MEXICO

H. F. Wreford, sec., 11 Cornhill, London, E. C., Eng. R. M. Raymond, resident managing director in Mexico City; R. T. Bayliss, chairman; P. L. Foster, J. R. Maguire, H. Mosenthal, John E. Dudley Ryder, G. D. Smith, O. E. Warburg, and J. H. M. Shaw, directors. Organized March 8, 1909, under laws of Great Britain, capitalization £250,000, shares £1 par; all the shares are issued, 3s. 6d. paid, and are held by the Exploration Co., Ltd. A dividend of 8s. per share, payable in fully paid Buena Tierra mining shares, was declared, Aug., 1912. Company is a subsidiary of the Exploration Co., Ltd. It has acquired and sold to operating companies bearing these names, the Buena Tierra and Santa Rosa properties. Owns no copper mines at present.

EXPOSICION MINING CO., LA. ARIZONA

See La Exposicion Mining Co.

FAIRVIEW GROUP. WASHINGTON

Situated near Chewelah, Stevens Co., Wash. Developed by 300' tunnel which recently uncovered a 5' vein of copper and silver ore.

FAIRVIEW MINING CO. ARIZONA

Idle. Mine near Dragoon, Cochise Co., Ariz. W. E. Wright, sec.-treas. and gen. mgr., at last accounts. Organized Dec. 3, 1909, under laws of Arizona, capitalization \$400,000, shares \$1 par, nonassessable; \$200,000 preferred and \$200,000 common stock; issued, \$100,000. Property, 17 claims,

unpatented, with a 15-acre mill site, in the Dragoon district, 5 miles south of Dragoon. Claims show a gossan outcrop over a replacement deposit in limestone, developed by shafts of 20' and 145' depth, showing malachite and sulphide ores, estimated to average 0.8% copper, 0.3 oz. silver and \$1.60 gold per ton. Has 2 mine buildings.

FAIRVIEW MINING CO.**CALIFORNIA**

Mine office: Relief Hill, Nevada Co., Cal. Eleanor E. Hoeft, pres., and Elbert E. Boyd, treas. Lands, 8 claims, area 160 acres, 21 miles north-east of Nevada City, nearest rail point. Property has 5 to 12' vein with schist hanging wall and serpentine foot wall, capped by an iron-stained schistose gossan. Development is by a 375' tunnel on the vein, with a back of about 170', showing chalcopryrite, with some gold, in a gangue of quartzite and iron oxide. The ore averages 1.1% copper, 16 cts. silver and \$4 gold per ton. An open cut on the outcrop was worked for gold, by sluicing, some years ago.

FANNY FERN MINING CO.**COLORADO**

Mine office: Lake City, Hinsdale Co., Colo. A. O. Egbert, supt., at last accounts. Property carries copper and silver-lead ores, developed by a 200' tunnel. Was developing with a small force, at last accounts, 1911.

FARRELL COPPER CO.**MONTANA**

Idle. Mine at Butte, Silver Bow Co., Mont. W. C. Lewis, pres.; Carlton H. Hand, vice-pres.; J. D. Slemons, sec.-treas.; preceding officers, A. T. Morgan, Walter C. Lewis, Donald Campbell, W. H. Hall and Daniel Tewey, directors. Organized July 24, 1906, under laws of Montana, capitalization \$1,000,000, shares \$2.50 par. Lands, 17 acres, in the southeastern part of the Butte district, having a 200' shaft, sunk jointly with the Alliance Copper Co., with a crosscut on the 200' level showing a little ore carrying copper, lead, zinc and silver values.

FARWELL MOUNTAIN COPPER CO.**COLORADO**

Office: 112 St. James St., Montreal, Canada. Mine in Routt Co., Colo. J. A. Ouimet, pres., 301 Essex St., Lawrence, Mass. J. R. Simpson, vice-pres.; W. H. Moisson, sec.; J. U. Emard, treas.; preceding officers, and J. E. Lemay, A. B. Sutherland and T. J. Buckley, directors. Geo. B. McFadden, gen. supt.; C. D. McFadden, mine supt., engr. and purch. agt. Organized March, 1907, under laws of Colorado, capitalization \$5,000,000, shares \$5 par.

Property, 42 claims, 434 acres, 30 claims patented and 560 acres placer ground, in the Hahn's Peak district, Routt county, Colo. Ore occurs in vertical fissure veins, running northeast along quartz porphyry dikes in granite. Veins carry values in gold and silver with some copper, the one under development is said to be 8' wide, proven to a depth of 351' and carries a total value of \$14 per ton.

Development by crosscut tunnel has cut 2 well defined veins and several smaller ones, but the big vein noted above is not yet cut. There are also 10 shafts, 10 to 94' deep and 20 tunnels, longest 625'. Total length of underground workings 2,320'.

Equipment includes gasoline engine and blower with 10 buildings. Company plans erection of treatment plant on property, completion of crosscut tunnel, blocking out of orebody and development of hydro-electric power on the Elk river, 7 miles distant. The U. S. Government has given a permit for the use of 2 reservoir sites. Property is 27 miles from the Denver, Northwestern & Pacific railroad.

FAVORITE GOLD & COPPER MINING CO.**WASHINGTON**

Office: Nelsonville, Ohio. Mine at Nighthawk. Okanogan Co., Wash. W. R. Calkins, pres.; Henry Loudenslager, vice-pres. and treas.; A. E.

Faine, sec.; preceding officers, Alois Thurn, E. R. F. Peterfish, J. E. Baldrige, Calvin Essex, John T. Meredith and Wm. F. Bort, directors; Edw. Williams, supt., at last accounts. Organized Dec., 1902, under laws of Washington, capitalization \$2,000,000, shares \$1 par, nonassessable.

Lands, 28 claims, 14 fractional, area 300 acres, adjoining the Night-hawk mine, in the foothills of Mount Ellemeham, in the Wannicutt Lake district, 34 miles from the Canadian Pacific railway.

The property has 3 veins, one, of 7' width, carrying copper, and 2 carrying silver-lead, with values mainly in lead. The principal silver-lead vein, of 1 to 5' width, has a 963' upper tunnel, and a 650' lower tunnel.

FAY-CANANEA COPPER CO.

MEXICO

Office: 2105 East Superior St., Duluth, Minn. Former mine office: Cananea, Sonora, Mex. Marcus L. Fay, pres. and gen. mgr.; G. A. Daugherty, vice-pres. and treas.; Geo. M. Fay, sec.; preceding officers, Wm. J. Schulze, John McDaniels and Leo Kannaple, directors. Organized Sept. 4, 1904, under laws of Arizona, capitalization \$3,000,000, shares \$5 par. Company holds title to its lands through the Cananea-Eastern Mining Co., S. A., organized under the laws of Mexico. Mr. Fay is said to own a majority of the issued stock.

Property, originally aggregating 2,127 acres, about 2 miles apart, has been greatly reduced, company retaining only the Cananea Eastern group. Former holdings were described fully Vol. VIII.

The Cananea Eastern property was acquired on a bond in 1912, by A.-C. Charlot and associates, of New York, on behalf of the Charlot Mining & Smelting Co., which in turn transferred the bond to the Eastern Cananea Development Co., who did extensive development work and made necessary repairs.

The Sulphide group has a strong vein, claimed to average about 150' in width, but it is improbable that the full width will be found workable. This property has an antiqua mine, with two 100' shafts, from which more or less high-grade silver ore was stoped in the past. New work includes 2 permanent shafts, deepest 162', at last accounts, and the beginning of a tunnel, planned to be driven 6,000', to cut 20 or more veins. A 26' shaft on the Azurite claim shows ore giving average assays of 6% copper, 10% lead and 30 oz. silver per ton. Property considered promising.

FEDERAL-ELY COPPER CO.

NEVADA

Office: 26 Stock Exchange Bldg., Salt Lake City, Utah. Mine office: Ely, White Pine Co., Nev. J. A. Cunningham, pres.; Adrian C. Ellis, Jr., vice-pres.; C. T. Strong, sec.; L. L. Farnsworth, treas.; Wm. J. Craig, mgr.; preceding officers, R. J. Evans, John T. Hodson and W. M. Bradley, directors; Geo. W. Kessler, supt. Organized 1906, and articles of association amended, 1908, to render the stock assessable, and a 5-ct. assessment was levied. Assessments levied in 1910, 1911 and 1912.

Lands, 21 claims, 3 fractional, 400 acres, also the Huesser ranch of 600 acres, 15 miles north of Ely, in the Steptoe valley, bought 1906. Mining lands are the Panama claim, bought, 1909, for \$10,000, lying about one-half mile north of the Star Pointer shaft of the Nevada Consolidated; 8 claims north of the Nevada Consolidated; 3 claims between the Cumberland-Ely and Turner-Ely, and the Queen of the West group, in Robinson cañon. Company is said to have paid \$225,000 for its lands.

The property north of the Nevada Consolidated shows limestone beds dipping to the east, said to be underlaid by cupriferous monzonite, and to carry 3 parallel shear zones, each about 400' in width, about 600' apart, showing a little copper and lead ore. The limestone capping on the Savage claim is said to carry lead ore. Churn-drill borings are said to have given

a satisfactory showing of ore, and there also was some test-pitting and surface trenching.

Development is by tunnels aggregating about 1,000' length and 4 shallow shafts, 3 said to show copper sulphides at depth of 100', the main shaft being said to be near the contact of 3 ore zones, which seems peculiar, if the ore zones are parallel, as claimed.

The Queen of the West shaft shows, at depth of 110', a sulphide ore-body of considerable size, averaging 3% copper, 1 to 2 oz. silver and 40 to 50 cts. gold per ton. No development work has been done for 4 years past. The Kessler shaft, about 100' deep, near the tunnel, shows lead carbonates of fair tenor. The mine has a small steam plant.

Company is in disrepute as it has done little save levy assessments for several years, doing barely enough work on the claims to meet annual assessment requirements. Their claims were surveyed for patent in 1912, but no application for patent had been made July, 1913. Company's standing and credit are not regarded favorably.

FEDERAL LEAD CO.

MISSOURI

Subsidiary of American Smelters Securities Co. Organized under laws of Delaware, capital \$2,000,000, shares \$10 par. The lead-smelting and refining plant is situated at Federal, Ill., near Alton, and comprises 302.5 acres.

The plant is a custom smelter. Mining property consists of 13,427 acres in the Flat River district, southeastern Missouri. The smelting plant is modern and mining properties in high state of development, fully equipped and producing. Operated 3 shafts during 1912, mining and milling 1,000,000 tons crude ore and producing, besides lead concentrates, a small tonnage of copper concentrate, recovered as a byproduct, holding 32,534 lbs. copper and 1,346 oz. silver. Described fully in Mineral Resources, U. S. Geol. Surv., 1912, p. 68.

FEDERAL MINES CORPORATION.

COLORADO

Idle. Mine at Idaho Springs, Clear Creek Co., Colo. H. A. Moore, supt., at last accounts. Has argentiferous and auriferous lead and copper sulphides, and is equipped with steam power.

FELIX BASIN COPPER MINES.

MONTANA

W. J. Harris, owner, Coram, Mont. Property consists of Proserpine, Big Elk, Iroquois, and Big Copper claims, situated 30 miles south of Coram and 5 miles south of the junction of Felix creek with the South fork of the Flathead river. Property shows 2 veins said to be 10 to 20' wide, traceable 2 miles, to carry concentrating ore with bunches of ore carrying 14 to 58% copper and good silver values. The U. S. Geol. Survey warns investors against this copper district as unworthy of the favorable notices appearing in the press.

FERN CLIFF MINING CO.

IDAHO

Idle. Mine address: Coolin, Bonner Co., Idaho. Malcolm J. McLeod, pres. Lands, 4 claims, formerly held by the Cabinet Range Mining Co., near the Priest Lake Mining Co. holdings, on the western side of Priest river, property, lying only 4 miles south of the international boundary, being difficult of access. Lands carry 6,000' of the strike of a mineralized zone of about 25' estimated width, proven by 2 open cuts, and trenching at the extreme ends. A 120' crosscut tunnel, with a back of about 100', shows lead and copper ores, selected samples carrying 87 oz. silver per ton, and up to 20% copper. A good water power is available.

FERRIS-HAGGARTY COPPER MINING CO.

WYOMING

Is an inactive company that actually owns, or did own, the copper mine of this name at Rudefeha, Carbon Co., Wyo. Company also owned \$375.-

000 of the Penn Wyoming bonds, but as its stock is practically all owned by the Penn Wyoming, its corporate officers and affairs are of no public interest, save as the only valuable mining asset of the chain of bankrupt corporations, controlled by the Penn Wyoming and its alleged and equally rotten successor, the United Smelters, Railway & Copper Co. The mine itself has been idle for many years. See Penn Wyoming Co.

FIDALGO-ALASKA COPPER CO.

ALASKA

Mine office: Ellamar, Alaska. Thos. Donahue, pres.; L. A. Levensaler, mgr.; W. G. Kelly, supt. Property, 24 claims, about 15 miles from Ellamar and one-half mile east of Irish cove, on the southern side of Fidalgo bay, an inlet of Prince William sound. Mine has a little stripping and trenching and several short tunnels, the 450' main tunnel following a well-defined fracture zone, in slate, carrying 2 lenticular ore shoots, said to be 5x50' in cross section, cut at 200' and 300' from portal, with many small stringers. Ore, mainly chalcopryite, said to give average assays of about 10% copper, occurs as cementing material of fractures, irregular stringers, disseminated grains and as lenticular replacements of country rock, the fracture zones being very erratic in size and extent.

Equipment includes 1,000' aerial tram, ore bins and wharf, besides several mine buildings. Company employing 16 men and figures on shipments averaging 300 tons a month; 400 tons were shipped in April, 1911, to Tacoma. Operations were continued throughout 1912.

FIDELITY COPPER CO.

IDAHO

Idle. Letters neither answered or returned from office: 541 Umatilla Ave., Portland, Ore., and mine: Homestead, Adams Co., Idaho. Jos. M. Healy, pres.; L. B. Reeder, sec.; R. A. Proudfoot, treas.; T. J. Senfurth, mgr.; R. A. Chipman, supt., at last accounts. Organized under laws of Oregon, capitalization \$1,000,000, shares \$1 par.

Lands, 17 claims, area 340 acres, near the Iron Dyke mine, 5 miles below Homestead, in the Seven Devils district, having a contact vein between granite-porphry and limestone, carrying native copper, azurite, malachite and chalcocite, mainly the latter, claimed to give assays up to 60%, with an average of 8% copper tenor. Mine has a 700' main tunnel, planned to be driven to give a back of about 1,000', showing ore assaying 8% copper, 5 oz. silver and \$4 gold per ton. Mine has about 1,500' of workings.

FIDELITY COPPER CO.

ONTARIO

Owens property 12 miles north of Sturgeon Falls, Ont., showing copper ore. W. G. Colwell, Buffalo, N. Y., pres. Company plans to resume work in 1913.

FIFE MINES, LTD.

BRITISH COLUMBIA

Mine office: Rossland, B. C. Chas. Dempster, gen. mgr. Property consists of the Hattie Brown claim at Rossland and the Dykehead, Ben Hur, Three Bells and Fife claims at Fife, near Christina lake, 12 miles east of Grand Forks, Boundary district, B. C. Claims show a vein up to 30' in width, carrying about 6' of smelting ore, with balance of concentrating grade, developed by a glory hole, an 80' shaft and a main tunnel having a 235' winze. Ore is mainly chalcopryite, carrying gold and silver values, claimed to average 3 to 6% copper and \$4 to \$8 gold per ton. Company did 1,000' of work in 1909, a large amount of diamond drilling in 1910 and resumed development in 1911-12. Average of 30 assays of ore from the dump gave 5.3% copper and \$4.20 in gold per ton. Some ore was shipped, 1909-12, to the Trail smelter. Equipment includes necessary mine buildings and a 5-drill Rand air compressor. Property considered promising.

FIFTY GOLD MINES CORPORATION.**COLORADO**

Liquidated. O. B. Thompson, former mgr., Blackhawk, Colo. Owned 50 patented claims, including the Gregory, Bobtail, Fiske and other mines, which have produced several million dollars worth of gold and silver-bearing copper ores since 1859. Has 80-stamp mill and other equipment. Property placed in receiver's hands 1910 and sold June 17, 1913, for \$61,500 to a Kansas City syndicate. Company now dead.

56 (FIFTY-SIX) COPPER MINE.**NEVADA**

J. P. Turner, operator, Winnemucca, Nev. Is the first quartz mine located in Nevada, being staked out in 1856, by L. D. Vary. The mine is in the southern end of the Eugene mountains, not far from the Humboldt river and southwest of Mill City. Was reopened in winter of 1912.

FINANCE MINING CO.**NEVADA**

Idle. Office and mine: St. Thomas, Lincoln Co., Nev. Levi Syphus, pres.; Robert O. Gibson, sec. Organized Oct. 23, 1906, under laws of Nevada, capitalization \$500,000, shares \$1 par, nonassessable. Lands, 4 claims, unpatented, in the Gold Butte district, 60 miles from a railroad, having a 120' shaft, with hand whim, showing ore carrying complex ores with copper, lead, silver and gold values.

FINDLAY COPPER CHIEF MINING CO.**NEVADA**

Idle. Office: Findlay, Ohio. Mine office: Las Vegas, Clark Co., Nev. John N. Dotz, pres.; P. M. Cox, sec.; R. E. Taylor, treas.; J. E. Kern, supt., at last accounts. Organized 1907, capitalization \$1,000,000, shares \$1 par. Lands, 2 claims, in the Yellow Pine district, about 25 miles southwest of Las Vegas, having a 30' shaft and a 60' tunnel, said to show ore.

FINLEY MINES.**UTAH**

Chas. A. Finley, owner, Castleton, Grand Co., Utah. Located 45 miles south of Cisco on Denver & Rio Grande railroad, 2½ miles northwest of the Miners Basin and about same distance from Castleton, in north end of the La Sal mountains. Property, 9 claims, shows gold-bearing copper ores in fissure veins and stock works in monzonite porphyry; also 2 claims 1½ miles from Castleton, showing a "blanket" deposit on a porphyry-lime contact. Geology described in U. S. Geol. Surv. Bull. 530, p. 113.

FIRST CHANCE MINING & MILLING CO.**UTAH**

Idle. Office: Salt Lake City, Utah. Mine office: Ibapah, Tooele Co., Utah. Wilkins Goodrich, pres.; Soren Nielsen, vice-pres.; John Jensen, sec.-treas., at last accounts. Organized Nov. 17, 1909, under laws of Utah, capitalization \$100,000, shares 20 cts. par. Lands, 7 claims, unpatented, in Paleozoic limestones cut by porphyry, in the Dugway district, 76 miles southwest of Center on the Salt Lake railroad, are slightly developed.

FIRST NATIONAL COPPER CO.**CALIFORNIA**

Wm. A. Kerr, sec., 111 Broadway, New York. Mine and works office: Coram, Shasta Co., Cal. Thos. W. Lawson, pres.; Wm. A. Kerr, vice-pres.; S. M. T. Raborg, treas.; Edgar L. Newhouse, director; Frank M. Leland, director and gen. mgr. Organized Jan. 20, 1908, under laws of Nevada, capitalization \$3,000,000, shares \$5 par, assessable; paid in \$3.75. Is said to have 5,500 shareholders, including American Smelters Securities Co., owning 80,000 shares. Stock is listed on the New York and Boston curbs. Empire Trust Co., New York, and State Street Trust Co., Boston, registrars; Registrar and Transfer Co., New York, and International Trust Co., Boston, transfer agents. Annual meeting, last Thursday in October, at Carson City, Nev. Cash on hand June 30, 1911, \$115,787. This corporation is a holding company, owning the entire capital stock of the Balaklala Consolidated Copper Co., which in turn owns the entire capital stock of the

Balaklala Copper Mining & Smelting Co., Coram Water Co. and other subsidiaries.

The mining property is described under the above titles. The smelter was shut down in 1909 by fume litigation in the California courts, and will not, and cannot resume operations until the Hall process or some other device is successful in eliminating the damage from fumes emitted in the operation of the company's smelter. Mine operated, Sept., 1913, shipping 50 to 100 tons of 4% ore daily to the Mammoth smelter of the U. S. Smelting Co.

The Balaklala Consolidated Copper Co. had a bond issue of \$1,500,000, which was paid by the First National, in 4 annual installments of \$375,000 each. The First National authorized, 1909, a \$1,000,000 bond issue, flotation of which was a failure, but pledged some of these bonds for a loan of \$375,000, which loan presumably was paid by the proceeds of the last assessment. The company also was reported to be earning about \$20,000 per month, in 1910, and immediately thereafter an assessment of \$1.25 per share was levied. The stock was manipulated to \$8 per share by Boston interests, but since Lawson's loss of popularity, has been scarcely saleable. The property is fully described under the title of its owner, the Balaklala Consolidated Copper Co.

FIRST NATIONAL MINING CO.

NEW MEXICO

Reported out of business by post office at Orogrande, Otero Co., N. M., described Vol. X. Property includes the Forest Queen mine, said to show a 20' vein, opened by tunnel and a 50' shaft, said to show ore having good assay values in lead, copper and silver, with a little gold. A shaft on the Monte Cristo claim is sunk on a fissure vein, and there is a tunnel on the Ruby claim.

FITZSIMMONS GROUP.

BRITISH COLUMBIA

P. O.: Newport, B. C. Property consists of All-Up and Yellow Jacket claims, located on Fitzsimmons creek, Howe Sound district, 38 miles from Newport, of which 26 miles is by trail. Mine is in the Greenlake country, tributary to the Pacific & Great Eastern railroad. Claims show a mineralized zone, 150' wide, with an orebody 10' wide, traceable for 250'. Outcrop forms a bluff 60' high with chalcopryite in epidote and garnet gangue. Outcrops show values of 60 cts. to \$4 gold, one-half to 1½ oz. silver and 5 to 12% copper per ton. Property examined by F. W. McCready, who reports very large quantities of payable ore on outcrop.

FIVE BEARS MINING CO.

CALIFORNIA

Office: 15 N. 40th Ave., Chicago, Ill. Mine office: Genesee, Plumas Co., Cal. F. A. Meidinger, pres.; A. Vermaas, sec.; J. D. Meidinger, treas.; preceding officers and E. C. Goeckel, directors. Organized April 10, 1903, under laws of South Dakota, capitalization \$2,500,000, shares \$1 par, non-assessable; issued, \$2,428,174.

Lands, 10 claims, patented, area 200 acres, well timbered, 21 miles from the Western Pacific railway. The property shows 6 orebodies, occurring as fissure veins in talcose schist, and as contact replacement deposits between schist and porphyry, of which 2 have been developed, to some extent. The gossan was worked, 1876-93, for gold. Main vein, of 14' estimated average width, carries chalcopryite, associated with pyrite, estimated by management to average 6% copper, 1.5 oz. silver and \$1.40 gold per ton. There are 2 tunnels, of 380' and 1,250', latter a drift tunnel, following the vein fault-fissure, showing low-grade chalcopryite for an average of about 12' width. Mine has 3,484' of workings, estimated to show 80,000 tons of ore, with 9,500 tons blocked out for stoping.

Equipment includes a 50-h. p. water plant, a 2-drill Giant air com-

pressor, and electric light plant. There are 11 buildings. A 50-ton mill has ten 850-lb. stamps. Property is now being operated under lease by Allison & Bluet of Los Angeles, Cal. It is reported that a copper-bearing deposit is being opened at a vertical depth of 900', ranging from 10 to 20' in width with high-grade ore. Two tons of concentrates produced daily.

FLAGSTAFF COPPER MINING CO.

UTAH

Merged in Wasatch Mines Co., 1912. Address: Paul D. Durant, sec. and organizer, 902 Wells Bldg., Milwaukee, Wis. Company sold stock on statement that it owned 240 acres of mineral land in the Little Cottonwood district, Alta, Utah, but most of the money so raised was used to pay for ground and amount available for development was not sufficient for extensive development. Work was directed toward exploration beneath the old stopes that produced several millions in silver in the 70's, expecting to find copper ores, which hope was not realized. Company has consolidated with the Columbus Consolidated, owning adjoining claims, and the Superior Alta, owning site for new drain tunnel, under name of Wasatch Mines Co. Described Vol. X.

FLAGSTAFF MINE.

MONTANA

Owned by Elliston Copper Co. Located on Snowshoe creek, 10 miles north of Elliston and developed by 200 to 400' tunnels. Ore occurs in limestone and carries gold and copper values.

FLAGSTAFF MINING CO., LTD.

IDAHO

Idle. Letter unclaimed at former mine office, Osburn, Shoshone Co., Idaho. Capitalization \$1,000,000, shares \$1 par. Lands, 4 claims, 3 miles from a railroad. Development includes a 25' shaft and a 350' tunnel. Traces of lead, copper, silver and gold ore have been encountered.

FLATHEAD DEVELOPMENT CO.

MONTANA

Address: care Gen. Chas. S. Warren, Butte, Mont. Mine at Coram, Mont. L. O. Evans and John M. Murphy of Butte, Fred Oliver and V. D. Williamson of Spokane; Dr. W. H. Campbell and A. Ingraham of Kalispell, organizers. Property comprises the Big Copper, Nos. 1, 2, 3 and 4 and Noble Copper claims covering veins 10 to 20' wide on Felix creek, a tributary of South Flathead river, 30 miles south of Coram, a station on the G. N. R. R.

FLATIRON MINE.

MONTANA

Office: Adolph Lewisohn & Sons, 42 Broadway, New York. Is owned jointly by Adolph Lewisohn and the Leonard Lewisohn Estate. Lands are about one-half acre, being a triangular fraction just east of the Mountain Chief mine of the Anaconda Copper Mining Co. Property, though small, is considered well located and promising, but is best developed by the workings of the High Ore mine, now beneath it.

FLEMING-FOX MINING & SMELTING CO.

NEW MEXICO

Office: 3 Exchange Ave., Chicago, Ill. Mine at Jicarilla, Lincoln Co., N. M. W. G. Fleming, pres.; Edwin Fox, mgr, at last accounts. Lands known as the Honey Bee group. Equipment includes a small steam plant. No trace of operations secured.

FLORENCE COPPER MINING CO.

ARIZONA

Address: Jas. C. Tharp, supt., Florence, Pinal Co., Ariz. Property is a copper-gold prospect that is intermittently operated and is developed by several shallow shafts.

FLORENCE MINING CO.

IDAHO

Address: John B. Steffes, Kellogg, Idaho. Property, a group of claims due east of the Alhambra and southeast of the Sherman and Roanoke mines. Developed by 45' crosscut tunnel, cutting vein carrying gray copper with galena in quartz gangue.

FLORENCE-RAE COPPER CO.**WASHINGTON**

Mine office: Index, Snohomish Co., Wash. N. Rudebeck, mgr. Lands, on Copper mountain, about 4 miles east of Index, have a tunnel showing a 10' paystreak of chalcopyrite in the Margurite vein and an assay of 400 lbs. taken across 6' of the vein averaged 12 oz. silver, 18.5% copper, 29.6% iron, 7.2% silica and 35.8% sulphur. Was surveying a line, 1912, to connect with the Great Northern or Milwaukee railroad and was working a force of 20 men.

FORD MINING CO.**ARIZONA**

Address: Geo. O. Ford, supt., Junction, Yavapai Co., Ariz. Property is a copper-gold-lead prospect in the Black Hills district, developed by shaft and prospected, 1913, by diamond-drill work.

FOREST HOME MINING CO.**CALIFORNIA**

Idle many years. Mine near Forest Home, San Bernardino Co., Cal. Property, about one-half mile north of Forest Home, has four 75' shafts, showing indications of copper.

FOREST QUEEN COPPER CO.**NEW MEXICO**

Address: Deming, N. M. H. F. Kettler, pres. and treas.; W. H. Sloss, sec., both of Deming, N. M. Annual meeting Jan. 12. Lands, Red Cloud and one other claim, 40 acres, in the Pinas Altas mining district of Grant county, N. M. Country rock is limestone cut by diorite intrusives. Ore-bodies occur in bedding planes of limestone with ore zone running north-east and dipping about 15° southeast into the mountain. There are said to be 4 or 5 thick orebodies in contact metamorphic deposits said to extend through for 3,000' across the claims; the ore consists of hematite, marcasite and chalcopyrite.

Development consists of only two 50' and 35' shafts, both in ore, and a 60' tunnel. Claims have been relocated many times. Property adjoins the Cleveland group and carries extension of the orebodies of that property. The A. T. & S. F. R. R. is 8 miles from the property. Rumors about consolidation of above company with the Cleveland and Utter groups are denied by Mr. Utter.

FORT HALL MINING & MILLING CO., LTD.**IDAHO**

Idle. Office and mine: Pocatello, Bannock Co., Idaho. Geo. W. Derr, pres.; W. A. Hyde, vice-pres.; W. H. Witty, sec.; L. Fargo, treas.; preceding officers and A. Fitzgerald, directors; H. M. Palmer, supt. Lands, 7 miles from Pocatello, are said by R. N. Bell, state mine inspector, to show big, low-grade deposits of copper-iron-sulphide ores, not as yet profitably mined. Equipped with steam power. No returns secured.

FORT HENRY MINING CO.**ARIZONA**

Idle. Address formerly care of R. G. Hourtienne, pres., Pasadena, Cal. Mine at Constellation, Yavapai Co., Ariz. John R. Dobler, supt., at last accounts. Lands in the Black Rock district, have a 55' shaft in a 2' vein of ore assaying up to 25% copper, with some gold values.

FORT PITT COPPER CO.**NEW MEXICO**

Address: care W. H. Staley, pres.; 633 Beechwood Ave., Carnegie, Pa. Mine near Clayton, Union Co., N. M. Organized Jan. 22, 1907, under laws of Delaware, capitalization \$2,500,000, shares \$5 par. The Fort Pitt Copper Co. succeeded the Sater Copper Co., which succeeded the Copper Chief Mining Co., which in turn succeeded the Old Hickory Copper Mining Co., all dead.

Lands, 27 claims, area 540 acres, also a 5-acre mill site, in the Black Mesa district, said to show 7 fissure veins in sandstone, of which 2, slightly developed, are claimed to be of 6' average width, and to carry melaconite, malachite, azurite and chalcopyrite, averaging 14% copper and 15 oz. silver

per ton, and mine to show 60,000 tons of ore. Development is by shafts of 85' and 225', and by tunnels of 25', 50' and 300'. Equipment is claimed to include a 190-h. p. steam plant, with 2 hoists, and the mine to have 4 buildings and an 18x70' mill. The original prospectus of the company, written by a cheerful liar, states that not one of the great mines of the United States has as great a percentage of copper as the Fort Pitt, and that there is a greater value back of this stock than any stock on the market, and that it is as safe as real estate, with 10 times the earning power, all of which statements are unmitigated prevarications. Present president of company writes in March, 1913, that steps are being taken to obtain government title, and the standing of the company at the present time is such that "the least said the better."

FORTUNA, S. A.; COMPAÑIA MINERA LA.

MEXICO

Office: Aguascalientes, Ags., Mex. Mine office: Tepezalá, Ocampo. Aguascalientes, Mex. Geo. B. Wardman, pres. and gen. mgr.; O. F. Westlund, vice-pres.; De Witt Crevelling, sec.-treas.; Alberto Pez, supt. Organized 1902, capitalization 200,000 pesos, shares 100 pesos par. Lands, 20 hectares, including La Fortuna and adjoining mines, having 2 tunnels and a 100-meter blind shaft, mines having a vertical depth of 200 meters and greatest horizontal length of 600 meters of workings, showing mainly oxidized argentiferous copper ores of good average tenor in both metals. Has animal power and employs 200 men normally. Probably idle owing to revolution.

FORTUNA COPPER CO.

CALIFORNIA

Idle. Mine at Fortuna, Humboldt Co., Cal. P. J. Mulley, pres. and gen. mgr.; Frank Legg, vice-pres.; C. A. Eastman, sec.; Fortuna Merchandising Co., treas.; A. E. Purdy, supt., at last accounts. Organized June 8, 1901, under laws of California, capitalization \$70,000, shares \$5 par. Lands, 19 claims, unpatented, area 380 acres, in Trinity county, Cal., opened by tunnels of 60' and 270', showing ores that have assayed 28% copper and \$3 gold per ton, in veins of 12 to 16" width.

FORTUNA GOLD & COPPER CO.

ARIZONA

Idle. Address: care Nathan Sturdy, supt., Phoenix, Ariz. Mine near Cave creek, Maricopa Co., Ariz. C. M. Clark, pres.; Maj. R. N. Whitney, vice-pres.; Wm. H. Simpson, Jr., sec.; F. E. Miller, treas., at last accounts. Organized under laws of Arizona, capitalization \$500,000, shares \$1 par. Lands, 12 claims, including the Scarlet mine, 28 miles north of Phoenix, said to have a promising surface showing and developed by a 500' tunnel showing a vein with gold-copper ore. Equipment includes gasoline hoist and an air compressor, and there is said to be a 50-ton concentrator. Work suspended, 1912, pending installation of stamp mill and concentration plant.

FORTUNA MINING CO.

ARIZONA

Address: care Judge D. A. Richardson, Douglas, Ariz. Mine address: care Johnson & Marvel, Superior, Pinal Co., Ariz. Organized Jan. 27, 1908, under laws of Arizona, capitalization \$1,000,000, shares \$10 par. Property, a group of claims near Superior, now under lease and bond to Johnson & Marvel, showing copper ore with high gold and silver values. Developed by the 250' Richardson tunnel following a vein carrying a 2 to 6" pay streak of 10% copper ore, assaying up to several thousand ounces silver and \$25 gold per ton, but cut off by a cross fault in face. Tunnel now being continued to cut the Fortuna vein at 750' from portal.

FORTUNA MINING CO.

UTAH

Idle. Office: 161 South Main St., Salt Lake City, Utah. Mine office: Bingham Canyon, Salt Lake Co., Utah. Simon Bamberger, pres.; J. B.

Bean, sec.; Jas. Start, supt. Organized March 10, 1904, under laws of Utah, capitalization \$300,000, shares \$1 par, nonassessable; fully issued.

Lands, 23 claims, mainly fractional, area 175 acres, adjoining the Ohio, in Keystone gulch. Property shows monzonite porphyry, quartzite and limestone, with a series of 4 nearly parallel veins following the strike and dip of the quartzite bedding, occasionally cutting across, and with some fracturing and crushing. The veins, of 2 to 5' width, carry films and veinlets of native copper, with occasional chalcocite. The mine carries silver-lead ores in the upper workings, with argentiferous and auriferous copper sulphides at depth, giving good assays. Mine has shafts of 150', 300', 200' and 1,100'; 2 crosscut tunnels of 400' each, and drift tunnels of 1,700', 4,200', 1,900', 900' and 400', with about 16,000' of workings. Mine was opened 1875 and closed 1908.

Equipment includes electric power, with 2 hoists, good for 1,500' depth, and an air compressor. The 50-ton mill was sold, 1910, to the Little Bell, and removed to Park City.

FORTUNE MINING CO.

ARIZONA

Address: 19 Lawler Block, Prescott, Ariz. A. W. Davis, pres. and gen. mgr.; H. J. Marshall, vice-pres.; J. P. Dillon, sec.-treas.; preceding officers. J. E. Russell, A. E. Broas, J. L. Dennerlein, M. Collins, directors. W. W. Lewis, cons. engr. Property, the Wizard mine and other claims in the Big Bug mining district, Yavapai county. Is a gold mine in which high-grade copper ore was found Oct., 1913. Development by 900' tunnel on the vein shows 4 to 6' of ore in a shoot 800' long. Oct. 14, 1913, company reported a 2' body of copper sulphide with black oxide of copper in the face of the tunnel. Company plans extending tunnel 350' further and then sinking.

FOSS RIVER CONSOLIDATED COPPER CO.

WASHINGTON

Idle. Office: Everett, Wash. Mine is 8 miles from nearest railway station, Berlin, King Co., Wash. Hon. Albert W. McIntire, pres. and gen. mgr.; E. A. Nickerson, vice-pres.; F. P. Smith, sec.; Leighton Howard-Smith, treas. Organized Dec. 10, 1901, under laws of Washington, capitalization \$2,000,000, shares \$1 par.

Lands, 18 claims, area 328 acres, also a 30-acre mill site and 40 acres timberlands, in the Foss River district, opened by a 55' shaft and tunnels of 35', 45', 65' and 310', showing several veins, of which the largest, estimated at 180' width, carries bornite and chalcopryrite giving assays of 3 to 54% copper, 2 to 40 oz. silver and 80 cts. to \$44 gold per ton. Management planned installation of water power and a 4-drill air compressor. Owners exhausted their means and shut down mine, 1910.

FOUR LEDGE MINING CO.

IDAHO

Mine address: Osburn, Shoshone Co., Idaho. W. C. Reeder, pres.; John Hall, vice-pres.; Henry King, sec.; Ben E. Hervey, gen. mgr. Property, a silver-lead proposition, with 5 claims, on the eastern fork of Two Mile creek, about 2 miles north of Osburn, shows 4 veins of 10 to 50' estimated average surface width, carrying copper and lead ores. Mine has about 900' of tunnels, including a 160' drift tunnel and a 180' crosscut tunnel.

FOUR METALS MINING CO.

ARIZONA

Reorganized as Red Mountain Mining Co. Owns the Four Metals mine near Patagonia, Ariz. Described Vol. VIII.

FOUR METALS MINING CO.

COLORADO

Probably dead. Post office at Telluride, San Miguel Co., Colo., advises no such company there, and letters are unclaimed at company's St. Louis and Silverton addresses. W. Frank Carter, pres.; R. M. Scruggs, sec.-treas.

Organized Jan. 17, 1899, under laws of Colorado, capitalization \$2,000,000, shares \$1 par. Lands were 47 claims, area 516 acres, at Silverton, San Juan county, and claims, known as the Andrus mine, in Ingraham basin, near Telluride. Had a mill at the Palmyra mine, and a steam plant at the Andrus.

FOUR METALS MINING CO.

UTAH

Idle. Letters unclaimed at Salt Lake City, and Callao, Juab Co., Utah. H. Hugo Brandeis, pres.; R. P. Hill, sec., at last accounts. Lands, in the Dugway district, carry auriferous and argentiferous copper, zinc and lead ores. Mine is opened to depth of 400' and has a small concentrator.

FOUR METALS SMELTER & MINING CO.

CALIFORNIA

Office: San José, Cal. Mine and works office: Keeler, Inyo Co., Cal. Henry T. Welch, pres.; A. R. Short, sec.; E. O. McGrath, mgr. Property, the Cerro Gordo silver-lead mines with 35 claims, 8 miles from Keeler, including the Union mine, on Cerro Gordo hill, and a water-power on Lone Pine creek. The reorganization, 1912, gave creditors 90 cts. on the dollar, but stockholders said to have lost their investment.

The Union mine is an antigua, worked by Mexicans in early days, and is opened to a depth of 900', carrying ore with chalcopryite, galena and sphalerite, occasionally with some very high-grade silver ore, values being in silver, lead, copper and gold in about the order named. There is a large tonnage of discarded ore and slag, from former smelters, said to assay up to \$25 per ton.

Development by 900' shaft and tunnel. This new tunnel cuts the deposit 400' below the surface. The old tunnel, 125' higher, shows 500' of low-grade copper ore. The zinc ore comes from the Union tunnel and the 200' and 400' levels; the silver-lead ore from between the 600' and 900'. Transportation between the mine and smelter is by a 27,000' Montgomery aerial tram, with drop of 4,850'.

The Swansea smelter, built at Keeler, and removed later to Swansea, 3 miles to the north, has one 50-ton furnace, and was blown in, 1909, doing a little custom business when in blast, but ran a short time only, and has been idle since 1909.

Mine production, 40 to 50 tons of silver-lead ore each week, shipped to the United States Smelting Co., at Salt Lake, and 30 tons a day of 30% zinc ore. L. D. Gordon holds a lease on the zinc-yielding part of the mine. Property considered promising.

FOURTH OF JULY MINING & MILLING CO.

COLORADO

Idle. Mine at Eldora, Boulder Co., Colo. J. B. Johnson, supt., at last accounts. Mine is opened by shafts, and a 220' tunnel, planned to cut the Olympic and Fourth of July veins, from which assays of 25 to 45% copper, occasional lead, 50 to 125 oz. silver, and \$30 to \$80 gold per ton, have been secured.

FOX COPPER MINING & MILLING CO.

IDAHO

Letters neither answered nor returned from Mullan, Idaho, or Saltese, Missoula Co., Mont. O. W. Carter, pres.; Wm. Schierding, vice-pres.; Wm. G. Newbury, sec.-treas., at last accounts.

Lands, 9 claims, 6 miles east of Saltese, having a vein of 15' estimated width, carrying chalcopryite, giving assays up to 27% copper, 17 oz. silver and \$5 gold per ton. Lands also show lead ore, occurring as galena impregnations in quartz porphyry. Development is by 2 tunnels, lower said to show good values in copper and lead, and a 64' shaft, planned to be sunk 500', near the portal of the lower tunnel. A one-mile flume furnishes water, under a 230' head, to a water wheel actuating a 4-drill air compressor.

FRANCIS, CHAS.**ARIZONA**

Owens a producing copper property near Morristown, Maricopa Co., Ariz.

FRANK HOUGH MINING CO.**COLORADO**

Office: 830 Equitable Bldg., Denver, Colo. Mine: Lake City, Hinsdale Co., Colo. A. E. Reynolds, mgr.; J. D. Fisher, supt. Organized 1907, under laws of Colorado. Mine, on Engineer mountain, has a 2,500' tunnel, developing a large body of slightly argentiferous and auriferous copper sulphides, including bornite, with assays up to 27% copper, 47 oz. silver and \$5 gold per ton. Mine shipped several hundred tons of high-grade argentiferous copper ore, under former ownership. Equipment includes 800-ton shipping bins. Production, 1909, was about 450 tons, shipped to the Durango smelter, claimed to have averaged about 35% copper, with fair values in silver and small gold values. Mine was shipping, July, 1910, about 10 tons of ore daily, to the Durango smelter. Production is estimated at 250,000 lbs. fine copper in 1909, and 600,000 lbs. in 1910. Property considered promising, but was closed down in 1912 because of destruction by fire of its surface equipment. No recent returns secured.

FRANKLIN JUNIOR MINE.**MICHIGAN**

Owled by Franklin Mining Co., at Demmon, Houghton Co., Mich.
FRANKLIN MINING CO.

MICHIGAN

Office: 60 Congress St., Boston, Mass. Mine office: Demmon, Houghton Co., Mich. Mill office: Point Mills, Houghton Co., Mich. Employs about 350 men. R. M. Edwards, pres. and gen. mgr.; Albert L. Wyman, sec.; Henry Tolman, treas.; preceding officers, Charles G. Rice, Sidney J. Jennings, John C. Watson and Harry M. Howard, directors. Enoch Henderson, supt.

Organized April 3, 1857, under laws of Michigan, capitalization \$500,000, and reincorporated, 1887, for 30 years, capitalization increased, 1899, to \$2,500,000, and again increased, Nov., 1908, to \$5,000,000, shares \$25 par; issued, 166,358, paid in \$14.20, to Dec. 31, 1912. Unissued stock, 33,334 shares, has been set aside for the purpose of acquiring the total capitalization of 100,000 shares of the Rhode Island Copper Co. Has paid dividends of \$1,240,000, and has levied assessments of \$1,420,000, including a \$2 assessment called Jan., 1911. Federal Trust Co., Boston, registrar; American Trust Co., Boston, transfer agent. Annual meeting, third Wednesday in April.

Lands, 3,280 acres of mineral property, and a 217-acre mill site, having 1 mile of frontage on Portage lake. The old Franklin mine, area 160 acres, was sold, July, 1908, to the Quincy Mining Co., for \$170,000, and Sec. 6, T. 55 N., R. 33 W., area 640 acres, lying directly north of the Franklin Junior and west of the Rhode Island, was bought from St. Mary's Mineral Land Co., 1909, for 33,333 shares of stock.

Property carries 2 miles of the strike of the Pewabic amygdaloid and other cupriferous beds of the Keweenaw series. In addition to the main tract, there are 3 other tracts of mineral lands, of 160, 480 and 640 acres. The company also controls, and is absorbing, the Rhode Island Copper Co., which has 800 acres immediately north of the Franklin Junior mine. The old Franklin mine, sold to the Quincy Mining Co., was described Vol. VIII.

The Franklin Junior mine, bought 1895, was opened, 1860, as the Albany & Boston, and was reopened, 1882, as the Peninsula. The Franklin Junior consists of 2 distinct mines on parallel beds, these being the old Albany & Boston mine, opened on the Allouez conglomerate, and an

amygdaloid mine, opened 1896, on the Pewabic bed, the Pewabic lying 475' west of and parallel with the Allouez conglomerate.

The first work on the Franklin Junior mine was done on the Pewabic amygdaloidal bed, which returned an average of only about 0.45%, or 9 lbs. fine copper per ton of rock stamped, hence the amygdaloid shafts were abandoned, Feb., 1902, and work transferred to the old Albany & Boston workings, the reopening of which was begun in 1900. Owing to unfavorable development, and continued decrease in the copper content of the conglomerate bed, as well as a gradual narrowing with depth, work was abandoned on the conglomerate mine, July, 1909, and operations again transferred to the Pewabic amygdaloidal bed.

The Allouez conglomerate in the upper workings averaged 18 to 22' width, with an extreme of 30' in the upper workings, but grew narrower at depth. The bed was notably lean on the hanging wall, 3 to 5' being left unmined, and very little assortment of rock was attempted. The conglomerate is somewhat more regular in its copper contents than to the northward, where it is very buncy in the old workings of the Allouez mine, but is distressingly low in average grade at all points.

No. 1 shaft of the conglomerate mine, 2,300' deep, is idle, and the shaft rock house has been torn down. No. 2 conglomerate shaft, 1,200' south of No. 1 and 1,200' deep, has been abandoned.

The Pewabic workings were reopened, 1908, after 6 years idleness, and all mining operations were transferred to this bed, 1909. The amygdaloid shafts are numbered from north to south, and are sunk at an angle of 48° 30'. Diamond-drill borings to determine the foot and hanging, and test the ground for values, have shown that the bed splits into 2 and occasionally into 3 parts, of variable width, and there are 2 clearly-defined portions, known as the East bed of 7 to 9' average width, and the West bed of 10 to 12' width, the 2 being separated by a varying width of trap.

There are 4 shafts on the Pewabic bed, of which 2 are idle, Nos. 1 and 3 being the working shafts. The North shaft, about 900' south of the Rhode Island line, is about 1,000' in depth. No. 2 shaft, 1,000' south of No. 1, and 1,100' north of No. 3, is about 1,100' deep.

No. 1 shaft, sunk about 20' in the footwall, was sinking for the 36th level, at the end of 1912, and was showing considerable improvement below a depth of 2,000'. The longest drift, on the 15th level, is about 2,600', and a limited amount of work is in progress from the 20th level down. This shaft has a loading bin, between the 27th and 28th levels, and between the 31st and 32nd levels, receiving rock from the various levels above. The shaft is equipped with a steel circular rock house (Edwards design), formerly in use at No. 2 conglomerate shaft.

No. 3 shaft, 2,100' south of No. 1, is sunk about 40' in the footwall, and is temporarily bottomed at the 17th level. Shafts Nos. 1 and 3 are connected by drift on the 15th level, above which depth very little ground of promise has been opened, the better ground coming in below a depth of 2,000'. Equipment at No. 3 includes a wooden shaft house and a temporary hoist.

In addition to the Allouez conglomerate and Pewabic amygdaloid beds, the Franklin Junior tract carries the Mesnard epidote, Calumet conglomerate and Osceola and Kearsarge amygdaloids, all supposed to have been opened by a 975' crosscut driven west on the Pewabic lode, many years ago, this crosscut showing 1 conglomerate and several amygdaloidal beds carrying copper in small quantities. The ground opened was disturbed, and a crosscut at much greater depth might give better results. The Kearsarge bed is supposed to have been cut, 1906, by diamond-drill borings, and

also by a crosscut, but was found valueless where opened. Dr. L. L. Hubbard estimates, on data furnished by Reginald C. Pryor, that the Kearsarge amygdaloid should lie 1,308' horizontally east of the Allouez conglomerate, which would indicate that the old 975' crosscut, driven 1894, did not reach the Kearsarge, and, in consequence, the old crosscut was extended eastward, 1906, but the Kearsarge bed, or what is supposed to have been such, was not found to carry workable values, at that point and depth.

Several diamond-drill holes were bored, 1910, in the territory lying between 2,000' and 3,000' west of the Pewabic bed, in the hypothetical horizon of the Hancock amygdaloid, but nothing of promise was disclosed.

Surface equipment includes substantial and well-equipped machine, carpenter and blacksmith shops, engine houses, boiler houses, warehouses, changing house, office and a considerable number of substantial dwellings. There are air compressors of 10, 12 and 36 drill capacities.

The new hoist at No. 1 shaft, built by the Nordberg works, embodies several novel engineering ideas, furnished by Mr. Edwards. It hoists a 10-ton skip, and has special air-compression cylinders, storing up energy, otherwise wasted, in compressed air, the compressed air being mixed with steam, in the cylinders, as a prime motive force.

The 177x194' mill, of steel, on stone foundations, is reached by the Mineral Range railroad. Equipment includes 5 Allis-Chalmers 2-way heads, with 20x24" cylinders, each capable of crushing 350 tons of conglomerate or 500 tons of amygdaloid rock daily. Each stamp is fed from a 1,000-ton rock bin, and equipped with hydraulic separators, which remove considerable heavy copper. The washing plant includes 8 Woodbury classifiers, 20 roughing jigs, 15 finisher jigs, 32 Wilfley and 10 Overstrom tables. The jigs are of the Hodge eccentric type, with centershield copper discharges, obviating skimming.

Power for the mill is furnished by a 16x32" Allis-Chalmers engine, and steam is supplied by two 500-h. p. Stirling boilers. The boiler house has a self-supporting brick-lined smokestack of 7' diameter, 165' high, on a 52' brick foundation. Water is furnished by a 15,000,000-gal. Allis-Chalmers vertical compound pump, having 12x42" high pressure and 42x42" low-pressure cylinders, with 47" stroke and plungers of 37½" diameter. Water is drawn through a 36" pipe line, running 200' under the rock to a crib protected by quarter-inch screens. The mill has a 5x12" duplex fire pump with fire hose, and electric light. There is a 267' wharf at the mill site, equipped with coal hoist and sheds, with 18' of clear water alongside. The mill site has about 20 dwellings for employees.

In 1903 the recovery of copper was 15.25 lbs. per ton of rock stamped, and in 1907 was only 11.48 lbs., falling, 1909, to 9.47 lbs. per ton of rock stamped. The largest production ever secured by the mine was 5,259,140 lbs. fine copper in 1902, and recent production has been: 4,206,085 lbs. in 1905; 4,228,650 lbs. in 1906; 4,401,248 lbs. in 1907; 3,703,421 lbs. in 1908; 1,615,556 lbs. in 1909; 966,353 lbs. in 1910; 820,203 lbs. in 1911; 1,710,651 lbs. in 1912.

FRASER MOUNTAIN COPPER CO.

NEW MEXICO

Idle. Property at Twining, Taos Co., N. M. Company wrecked, but property bid in by trustees, and held for sale or reorganization. Property promising. See Ore Deposits of New Mexico, Prof. Paper No. 68, U. S. Geol. Surv., p. 84. Fully described Vol. VI.

FREE COINAGE MINING & MILLING CO.

UTAH

Office: 69 Commercial Bldg., Salt Lake City, Utah. Mine near Alta, Salt Lake Co., Utah. L. A. Evans, pres.; D. H. Wenger, sec.-treas. Or-

ganized 1896, under laws of Utah, capitalization \$125,000, shares 25 cts. par, assessable, with 2 assessments levied. Lands, 4 claims, 3 patented, in Little Cottonwood cañon, 2 miles from a railroad, having a 50' shaft and tunnels of 100' and 525', showing auriferous and argentiferous lead and copper ores. No returns secured.

FREEDOM MINING CO.**COLORADO**

Was a close corporation, owning Freedom mine, Central City, Colo., now absorbed by Consolidated Mining Co.

FREELAND CONSOLIDATED MINING CO.**OREGON**

Office: Salem, Ore. Mine at Elkhorn, Marion Co., Ore. Hugh Freeland, owner. Assessment work only has been done since 1911. Organized 1901, under laws of Oregon, capitalization \$2,000,000, shares \$1 par, non-assessable; issued, \$1,625,000. Annual meeting, third Monday in April.

Lands, 13 claims, unpatented, area 200 acres, with about 100 acres timbered, on Gold creek, a tributary of the Little North fork of the Santiam river, 18 miles from Gates, the nearest rail point. Lands show porphyry, syenite and diorite, with occasional Tertiary sedimentary rocks, having 5 fissure veins, of which 3, under development, are estimated by the company at 17' average width, and to be traceable 2,000'. Veins have 1 to 6" stringers, carrying chalcopryite and occasional native copper, and the pyrite adjoining carries gold. Ores are reported by the company to range 1 to 14% copper, and \$2 gold per ton. The mine has a 175' crosscut tunnel, and about 1,300' of workings. There are 4 buildings.

FREMONT DEVELOPMENT CO.**WYOMING**

Office: Houghton, Mich. W. A. Hodgson, pres.; Wm. D. Calverley, vice-pres.; preceding officers, J. H. Rice, Deen L. Robinson, John T. Reeder, A. Anderson and R. T. Goodell, directors; Thos. Mullen, sec.-treas. Organized Dec. 9, 1909, under laws of Wyoming, capitalization \$200,000, shares \$10 par; in \$25,000 full paid and \$175,000 part paid stock, latter \$4 paid, Jan. 16, 1911. Total assessments to 1913, \$52,500. Houghton National Bank, registrar. Lands are held on a bond and lease, in 1913, with final payment of \$65,000, to be made at some future time.

Property, 3 patented claims, known as the McGrath group, about 18 miles north of Shoshoni, the nearest station on the Lander branch of the Chicago Northwestern railroad. The claims show granite, quartzite and mica-hornblende schists, carrying a fissure vein for length of 4,500', vein running N. 70° E., with dip of about 80°, varying 20° from the strike of the schist beds. The vein has a surface width of 6" to 4', increasing, at shallow depth, to a maximum of 9' width, and at its widest point gave average assays of 5.35% copper. Vein carries oxidized ores, silicates and sulphides, with a 6" footwall pay streak of banded massive chalcocite and quartz. All ore is more or less argentiferous and auriferous, giving assays up to 7 oz. silver and \$4 gold per ton.

The mine has a 94' two-compartment shaft, with 350' of laterals, and is to be deepened to 2000', with crosscutting and drifting. Mine is wet, and has a Cornish pump. There also are several exploratory pits and shafts, deepest 45'.

Equipment includes a 35-h. p. Fairbanks & Morse gasoline hoist, pump and fan. Company to take power from the Asmus Boysen dam, at Thermopolis, 1913. Veins small, but workable. Capitalization reasonable and property likely to be developed into a good, small mine.

FREMONT MINING & MILLING CO.**ARIZONA**

Idle. Company unknown in Denver, Colo., and Constellation, Ariz. I. F. Dawson, sec.-treas., at last accounts. Organized under laws of Arizona, capitalization \$3,000,000, shares \$1 par. Company had 6 claims, 10

miles northeast of Wickenburg in Yavapai county, Ariz. The Nevada shaft was 50' deep, and reported to show an 18" vein, carrying ore said to average 35% copper and \$8 gold per ton. Not regarded favorably.

FRESNO COPPER CO., LTD.

CALIFORNIA

Idle. Liquidators, Messrs. Balfour, Guthrie & Co., London, England. Mine address: Clovis, Fresno Co., Cal. Sir John H. N. Graham, Bart., chairman; N. W. Helme, M. P., Dr. R. Jackson, T. Hannay, W. B. Rankin and W. Lindsay, directors. Organized April 2, 1902, under laws of Great Britain, capitalization £400,000, shares £1 par, and reorganized, under same title, Feb. 12, 1907, capitalization £100,000, shares 4s. par; issued, 399,178 shares, fully paid. In 1910 paid a \$55,000 mortgage, and gave a \$40,000 trust deed as security for a new mortgage, to the California Title Insurance & Trust Co.

Lands, 2,520 acres, freehold.

In 1901 H. B. Vercoe bought, for about \$12,000, a ranch in Fresno county, having an old 120' shaft, called a copper mine. This ranch was made the basis of the £30,000 California Copper Syndicate, which sold the property to the Fresno Copper Co., Ltd., for shares in that company. Average assays 1.04% copper and 13 cts. per ton in combined gold and silver values. Property carries 3 veins, in mica-schist and diabase, the central vein, which is the only one developed, having a heavy gossan, underlain by an 18' vein carrying oxidized ores to depth of 50' succeeded by sulphides in the form of narrow streaks of chalcopyrite. The mine has shafts of 35', 45', 50', 200' and 530', with drifts on the 200' and 300' levels, showing a vein of about 14' average width, carrying solid sulphides, mainly slightly cupriferous pyrrhotite. The ore is low in copper, but high in iron and sulphur, and being free from zinc and arsenic, make an excellent flux.

The mine has a steam plant and electric current from the San Joaquin Power Co. Equipment includes a hoist, air compressor and electric light plant, and buildings include a machine shop, assay office and saw mill. A 4-mile branch railway has a locomotive and several ore cars.

The smelter, poorly constructed and never in blast, has two 200-ton circular blast furnaces, the converter department being an open iron shed, having a stand with 3 shells of the Leghorn type. The smelter power house has a 500-h. p. engine.

FRIDAY-LOWDEN COPPER CO.

CALIFORNIA

Idle. At Redding, Shasta Co., Cal. T. H. Benton, pres.; S. E. Brether-ton, vice-pres.; John R. Lowden, sec.-treas. and gen. mgr., at last accounts. Organized 1909, capitalization \$2,000,000.

Lands, 15 claims, partly patented, area 300 acres, near the Balaklala, Mammoth and Trinity mines. Considerable diamond drilling done is said to have proven extensive orebodies, and there are 5 tunnels, of 800' aggregate length.

FRISCO CONSOLIDATED MINING CO.

UTAH

Idle. Letters unclaimed at Salt Lake City and Frisco, Beaver Co., Utah. D. P. Rohlfing, pres. and gen. mgr.; H. S. Young, sec.-treas., at last accounts. Organized 1909, capitalization \$1,500,000, shares \$5 par, as a merger of the Frisco Contact Mining Co. and North Horn Silver & Copper Mining Co.

Property, 31 claims, mostly patented, 580 acres, carrying 8,600' of the strike of a wide mineralized zone, supposedly the extension of the Horn Silver contact zone. Lands include the Frisco Contact, North Horn Silver, Good Hope, Glorious and D. G. & J. groups:

The mine has several short tunnels, and 4 shafts, with about one-half

mile of workings, said to show 4 contact deposits, between limestone and andesite, one being estimated to range up to 115' in width. The main shaft, of 700' depth, with about 2,000' of drifting, shows, on the 600' level, ore impregnations assaying about 3.5% copper. The 125' Kruse shaft is about 2,000' northeast of the main workings, on the same ore zone.

Equipment includes an 80-h. p. hoist and a 4-drill air compressor at the main shaft, with two 60-h. p. boilers and a 50-h. p. hoist at the Kruse shaft. There are necessary mine buildings. The Horn Silver mine, adjoining, has been a large silver-lead producer, but the failure of the Cactus Co. at Newhouse, has blighted the entire crop of new companies, that grew up in the district when the Cactus property was flourishing.

FRISCO MINES & TUNNEL CO.

COLORADO

Office: Security Bldg., St. Louis, Mo. Mine office: Animas Forks, San Juan Co., Colo. Chas. Gagner, supt. Property, the Bagley mine, near Animas, developed by 11,000' tunnel cutting veins carrying gold, silver, copper, lead and zinc ores. A recent strike of very rich silver-copper ore has been made in the Red Cloud vein at a point 900' below the outcrop. Mine has electric power, air compressor, a 150-ton concentrating mill and employs about 75 men.

FRONTENAC CONSOLIDATED MINES, LTD.

COLORADO

Sec. and office: A. E. Rigden, Capel House, 54 New Broad St., London, E. C., Eng. Mine at Central City, Gilpin Co., Colo. Is a valuable gold mine, whose ores carry lead and copper, the latter as tetrahedrite, in small quantities. Fully described Vol. X.

FRONTENAC COPPER CO.

MICHIGAN

Idle. Office: 12 Ashburton Place, Boston, Mass. Operating office: Calumet, Mich. Quincy A. Shaw, Jr., pres.; Rodolphe L. Agassiz, vice-pres.; James MacNaughton, gen. mgr.; Geo. A. Flagg, sec.-treas., and F. W. Hunnewell, directors. Organized June 26, 1905, under laws of Michigan, capitalization \$500,000, shares \$25 par. Is controlled, through ownership of entire stock issue, by the Calumet & Hecla Mining Co.

Owns the Central mine and adjoining lands, 22,268 acres, in Keweenaw county, Mich. Property mainly south and west of the Manitou. The Central mine, worked 1854-97, on a fissure vein, was a large producer for many years and paid dividends of more than \$2,000,000. Property also includes the Winthrop mine, 800 acres, in Secs. 22, 23, 26 and 27, T. 59 N., R. 39 W., adjoining the Central. Lands were slightly prospected by diamond-drill borings, but nothing of especial value found, and work stopped, 1908. The tract, however, is very extensive, and, in view of developments elsewhere, it is altogether probable that payable mines will be opened, eventually, on the Frontenac holdings.

FURNACE CREEK COPPER CO.

CALIFORNIA

Idle. Office: 506 Traders National Bank Bldg., Spokane, Wash. Mine was at Greenwater, Inyo Co., Cal. Patrick Clark, pres.; W. B. Matteson, vice-pres.; J. J. Stewart, sec.-treas.; Abe S. August, asst. sec.; A. B. Harvey, gen. mgr. Organized under laws of Washington, capitalization \$2,250,000, shares \$1 par. Trust Company of America, New York, transfer agent. Guaranty Trust Co., New York, registrar. Shares are listed on the Butte Stock Exchange.

Lands, 21 claims, unpatented, 2 miles west of Greenwater. The camp is entirely deserted, and property, fully described Vol VIII, is worthless. Company had substantial balance in treasury and was looking for a good new property at last accounts.

GALENA BAY MINING CO.

ALASKA

Office: Pacific Block, Seattle, Wash. Mine office: Valdez, Prince

William Sound, Alaska. B. F. Millard, pres. and mgr. A. Stansford White, vice-pres.; Alfred Barge, sec.; J. S. Jurey, asst. sec. Organized 1906, under laws of Washington, capitalization \$500,000, shares \$1 par. Stock held by voting trust of 7 trustees for a term of 10 years, the Continental & Commercial Trust & Savings Bank issuing trust certificates, in lieu of stock, which are negotiable and transferable.

Company now owns control of the Standard Copper Mines Co., the Hemple Copper Mining Co., and the Reynolds Alaska Development Co. The company's holdings proper, acquired in 1907, are on Galena bay, about 30 miles from Valdez and include the Galena bay, Franklin, Nicholai mines, and the Vesuvius group. The property of the 3 companies noted above, was not operated in 1912.

GALENA COPPER MINING CO.

WASHINGTON

Idle. Letters unclaimed at Index and Seattle offices of company. L. E. Rader, pres.; H. M. M. Williams, vice-pres.; John M. Snook, sec.; Francis X. Waldron, treas.; Judson C. Hubbard, mgr., at last accounts. Organized Jan. 2, 1906, under laws of Washington, capitalization \$1,000,000, shares \$1 par.

Lands, 16 claims, in the Silver Creek district, showing chalcopryite, in veins of 3 to 18' width, said to have given assays of 18.5% copper, 2.9 oz. silver and \$4 gold per ton. Development by tunnel, and a shipment of ore to the Tacoma smelter is said to have given net returns of \$30 per ton. District promising if ores are treated by froth flotation process.

GALENA MINING CO.

UTAH

Idle. Letters unanswered from 207 Templeton Bldg., Salt Lake City, Utah, and unclaimed at mine, Milford, Beaver Co., Utah. M. C. Morris, pres.; S. N. Slaughter, vice-pres.; Alice Farnsworth, sec.-treas., at last accounts. Organized July 16, 1897, under laws of Utah, capitalization \$45,000, shares 15 cts. par, assessable; has levied 9 assessments. Lands, 6 claims, patented, 8 miles from a railroad, in the Beaver Lake district, having shafts of 100' and 250'.

GALENA RIDGE MINING CO.

WYOMING

Probably closed down. Letters unanswered at Meteetse, Big Horn Co., Wyo. Lands, 1,200 acres, patented, also timber lands and water rights, having 5 veins of good width, on one of which the 450' Oregon tunnel shows ores carrying copper, lead, silver and gold values, with quartz gangue. Development by crosscut-tunnel. Has a Pelton water wheel and 10-drill air compressor.

GARBUTT LEASING CO.

COLORADO

John Cortellini, superintendent, Leadville, Lake Co., Colo. Property has 1,000' shaft producing copper ore with good gold-silver values. Equipment electric.

GARFIELD MINING CO.

MONTANA

Owens group of 5 claims, 13 miles from Belgrade and 18 miles from Manhattan. A 450' tunnel is said to cut a gold-copper vein, 9 to 20' wide. Lower tunnel is to be driven to cut vein below zone of oxide ore.

GARFIELD MINING & MILLING CO.

IDAHO

Mine at Harvard, Latah Co., Idaho. Albert Burns, supt., at last accounts. Property is the Gold Bug mine, developing by shaft, carrying copper ore. Equipment includes a small steam plant.

GARFIELD SMELTING CO.

UTAH

Office: 165 Broadway, New York. Operating office: 714 McCornick Bldg., Salt Lake City, Utah. Works office: Garfield, Salt Lake Co., Utah. Daniel Guggenheim, pres.; F. R. Foraker, sec.; C. W. Whitley, gen. mgr.; Wm. H. Howard, supt. Organized 1905, under laws of New Jersey, capital-

ization \$1,000,000. Is owned by American Smelters' Securities Co., and itself owns the Garfield Water Co. and the Garfield Improvement Co. The smelter has cost, complete, about \$6,000,000. Fully described Vol. X.

GARLAND COPPER MINING CO.

WYOMING

Idle. Address: care E. S. Drury, Cheyenne, Wyo. Mine at Encampment, Carbon Co., Wyo. T. J. Upjohn, vice-pres.; preceding officer, E. S. Drury, O. F. Wickham and D. H. Palmer, directors. Organized July 10, 1902, under laws of Wyoming, capitalization \$1,500,000, shares \$1 par; issued, \$700,000. Lands, 4 claims, area 80 acres, in the Battle Lake district, having a 40' shaft and a 100' tunnel, on a vein of 50' estimated average and 300' maximum width, carrying a hematite gossan, supposed to be a continuation of the Itmay vein.

GARNET MINE.

NEW MEXICO

Mine near Oro Grande, Otero Co., N. M. Operated by C. C. Camp-house for English company and shipping copper-silver ore, 1913.

GARRETSON-SAHUARIPA CO.

MEXICO

Letters unanswered from 527 Ellicott Square Bldg., Buffalo, N. Y. Mine at Calera, Sahuaripa, Sonora, Mex. W. H. Farnsworth, pres.; Laurens Enos, vice-pres.; W. H. H. Davenport, sec.; D. B. Sherman, treas.; John A. Moore, supt., at last accounts. Organized 1903, under laws of Arizona, capitalization \$600,000, shares \$100 par, nonassessable; issued, \$450,000.

Lands, 96 hectares, and 14,000 acres of surface rights. Property, about 30 miles southeast of Sahuaripa, includes La Calera mine, having 6 ore-bodies, 2 under development, of 3 to 6' width, estimated by company to average 2% copper, 45 oz. silver and \$14 gold per ton, which is interesting, if true. Mine has about 1,200' of workings.

The smelter, 1 mile from the mine, receiving ore by pack trains, has a 50-ton 29x48" Garretson pyritic water-jacket blast furnace, burning charcoal and wood, which apparently has not worked well. Idle since 1908, awaiting construction of the Sonora Central railway from Tonichi, which has been surveyed to pass through this property.

GARRISON-MONSTER MINING CO.

UTAH

Idle. Office: 202 Utah Savings & Trust Bldg., Salt Lake City, Utah. Mine at Ibapah, Tooele Co., Utah. J. P. Gardner, pres.; J. S. Garrison, vice-pres.; H. B. Windsor, sec.; S. W. Morrison, treas. Organized June, 1906, under laws of Nevada, capitalization \$1,000,000, shares \$1 par, as a merger of the Garrison Gold & Copper Mining Co. and Monster Mining Co. Lands, 26 claims, patented, on Dutch mountain, in the Clifton district, 40 miles from Wendover, on Western Pacific railroad. Branch line to property will be completed, 1914. Mine, having 3,500' of workings, is said to show considerable bodies of silver-lead ore.

GARVANZA MINING & MILLING CO.

CALIFORNIA

Idle. Mine office: Cima, San Bernardino Co., Cal. H. M. Banfield, supt., at last accounts. Lands are on the western side of New York mountain, near Bryant station on the Salt Lake railway, showing a vein of 20 to 75' claimed width, carrying an argentiferous and auriferous sulphide complex of copper, lead and molybdenum. Work was begun 1906, and mine has about 2,000' of workings, on what is reported as a series of quartz veins, cutting granite.

A 100-ton mill is equipped with crusher, rolls, trommels and Standard tables, and has a 30-ton leaching plant, with three 10-ton tanks, producing a small quantity of thorium nitrate, by means of the hyposulphite leaching process.

GEM CONSOLIDATED MINES CO.**COLORADO**

Office: 341 Sixth Ave., Pittsburgh, Pa. Mine office: Idaho Springs, Clear Creek Co., Colo. Col. J. M. Guffey, pres.; John H. Galey, vice-pres.; W. S. Watson, sec.; Henry B. Clifford, resident director; W. E. Renshaw, gen. mgr.; J. Kaughman, mill supt., at last accounts. Organized Jan. 1, 1907, under laws of Colorado, capitalization \$5,000,000, shares \$1 par.

Lands, 10 claims, patented, and a mill site, showing a vein of 20 to 50' width, traceable 3 miles, carrying sulphide ores assaying up to 37% copper, 10 oz. silver and \$18 gold per ton. Mine has about 5 miles of workings, estimated to show 1,000,000 tons of ore, with 300,000 tons blocked out for stoping. A 550-h. p. hydro-electric plant supplies 350-h. p. to the mine and 200-h. p. to the mill. There are 4 hoists, good for 3,000' depth, and an 18-drill Ingersoll-Rand air compressor. Buildings include a machine shop, carpenter shop, smithy, etc., and a 100-ton stamp mill. No recent returns secured.

GEMINI MINING CO.**UTAH**

Office: 325 Brooks Arcade, Salt Lake City, Utah. Mine office: Eureka Juab Co., Utah. E. W. Packard, vice-pres.; J. E. Berkley, sec.; L. S. Hills, treas.; Jackson H. McCrystal, gen. mgr.; John H. McCrystal, supt. Paid \$6 dividend, Oct., 1911.

The property is a silver-lead mine with accessory copper ore, in shoots. There are 3 fissure veins, in an ore channel about 450' wide, cut transversely by a number of cross-fissures, making a rather complex system of orebodies, the main fissure, of 15 to 20' width, having a southeasterly dip, with ore shoots raking to the north. Ore composed of lead and copper sulphides, ores in the upper workings averaging about 12% lead and 40 oz. silver, while the bottom level, at 1,600' shows a 20' vein carrying argentiferous 3% copper ore. The mine has a 1,600' shaft, and a 300' winze, equipped with electric hoist, reaches to the 1,900' level. The adjoining Ridge & Valley mine is operated through the Gemini shaft. Company operating only below 900' level in 1912; upper levels leased, over 100 men being employed, Aug., 1913.

GENERA DEVELOPMENT CO.**U. S. A., CANADA & MEXICO**

Office: 42 Broadway, New York. Adolph Lewisohn, pres.; Theo. L. Herrmann, sec.; Sam A. Lewisohn, treas.; J. Parke Channing, cons. engr.; preceding officers, H. Ruhlender, W. H. Nichols, Jacob Langeloth, Samuel Untermeyer, Herman Sielcken, D. M. Hyman, H. W. Davis, Andrew Freedman, W. T. Rosen, J. A. Lewisohn, A. S. Rossin, J. H. Susmann and S. S. Rosenstamm, directors. Organized 1906, under laws of Delaware, capitalization \$2,000,000, increased later to \$2,500,000, increased 1909 to \$2,600,000, again increased, 1913, to \$3,000,000, shares \$100 par, nonassessable. Dividends paid 1908, 1½%; 90% in 1909 and 15% in 1910, a total of 106½%.

Company is controlled by the Lewisohn interests, and is operated as a close corporation, controlling, through stock ownership, the Colorado Gold Dredging Co., Miami Copper Co., New Keystone Copper Co., San Cayetano Mines, Ltd., and Naumkeag Copper Co. The increase of capitalization, 1913, was to finance the merger of the Silver Mines Exploration Co., the corporation which developed and promoted the Kerr Lake and Wettlaufer-Lorraine companies of Cobalt, Ont. Company has extensive stock interests in New Planet Copper Co. and Kerr Lake Mining Co., with other mining interests in Montana, Colorado, Arizona, Canada and Mexico.

The General Development Co. is a parent corporation, examining, developing and financing mining properties which, when they have reached the self-supporting producing stage, are turned over to operating com-

panies. / It is a powerful factor in the copper industry, and with the wide experience and astute guidance of Mr. Adolph Lewisohn, combined with the technical skill and great ability of J. Parke Channing, its consulting engineer, promises to become increasingly important.

GENERAL MINES CO.

MONTANA

Letters unanswered from last address, 25 Broad St., New York. Mine near Helena, Mont. Geo. Hyatt Robinson, pres.; Walter B. Tipton, vice-pres.; F. J. Chipman, sec.-treas.; B. Frank Johnston, ingr. at last accounts. Lands, in Avalanche gulch, across the Missouri river from Helena, have a 28' vein, opened by a 500' crosscut tunnel, showing auriferous and argentiferous copper sulphides. Idle several years.

GENESEE VALLEY COPPER CO.

CALIFORNIA

Address: Genesee, Plumas Co., Cal. A. L. Beardsley, pres.; Henry Metz, vice-pres.; Mel. J. Smith, sec.-treas.; A. B. Clark and J. E. Baum, directors. Organized Nov. 1, 1909, under laws of Nevada, capitalization \$2,000,000, shares \$1 par, nonassessable; issued, \$1,000,000. Annual meeting, August 1.

Lands, 15 claims, unpatented, area 300 acres, in 3 groups, and a 120-acre mill site, showing porphyry dike in meta-andesite, with bornite disseminated through the porphyry. Dike runs north 20° west, dips 54° southwest. Orebody reported as 80 to 300' wide, 3,000' long and proven for 150' depth assaying 3% copper, 2 oz. silver and \$0.50 gold per ton. Company reports, 1913, about 100,000 tons, and property needs no shafts or tunnels, as ore is exposed on side of mountain at angle of 45°, forming a side-hill quarry with bluff face 100' high. No recent development except drilling to determine tonnage and value. Ore shows 90% recovery by Minerals Separation flotation process,* concentrates carrying 35% copper, 10 oz. silver and 1 oz. gold per ton. Property considered promising.

GENESSEE VANDERBILT MINE.

COLORADO

Address: Ironton, San Juan Co., Colo. Property in the Red Mountain district and was formerly owned by the Red Mountain Mining Co., which was sold out for debt. Mine has a 3,000' tunnel cutting a vein carrying covellite, which is now being developed for stoping preparatory to shipments expected to be made, Sept., 1913.

GEORGIA & TENNESSEE COPPER CO. GEORGIA & FLORIDA

Idle. Office: William Tudor, treas., 15 Exchange St., Boston, Mass. Mine near Temple, Haralson Co., Ga. Theo. Sutro, pres.; Otis Kimball, vice-pres.; preceding officers, L. V. Briggs, and John T. Coolige, Jr., directors; H. M. Mansfield, supt. Organized Jan. 24, 1905, as a merger of Tallapoosa Copper Mines, Live Oak Phosphate and Georgia Pyrites Co., capitalization \$1,000,000, shares \$5 par; \$525,000 issued. Annual meeting, second Tuesday in January. No business done since 1906.

Owens 447 acres of copper-bearing lands, in Haralson county, near Temple, Ga., and 800 acres of phosphate lands, in Marion and Levy counties, Florida, latter claimed to carry 800,000 tons of phosphate. Copper lands show country rocks of Laurentian schists, with 2 contact veins of 4 to 19' width, between slate and sandstone, opened by a 300' shaft, with 1,250' of workings, estimated to show 85,000 tons of ore, with 45,000 tons blocked out for stoping, said to give average assays of 3% copper, 2.7 oz. silver and \$2 gold per ton. Ore is chalcopyrite, disseminated in pyrite, averaging 41% sulphur. Company planned installing an acid plant and manufacturing superphosphate for fertilizer, but failed to do so.

GERMAN-AMERICAN COPPER CO.

MEXICO

Letter unanswered from Leesville, La. Mine at Alamos, Sonora, Mex. C. M. McFarland, pres.; G. H. Schweitzer, vice-pres. and treas.; H. W.

Hackbarth, sec. Organized 1909, under laws of Arizona, capitalization \$100,000.

GERMAN COPPER CO.

ARIZONA

Secretary and office: Chas. H. Trotter, 975 West New York St., Indianapolis, Ind. Mine at Globe, Ariz. John H. Murdoch, pres.; Chas. H. Zollner, vice-pres.; John A. Hook, treas.; preceding officers, Wm. Elwarner, Jos. Lauler, David Fair, Wm. Burnett, John I. Carson and J. B. McMurray, directors. John H. Faught, supt.; P. H. Pernot, cons. engr. Organized March 25, 1911, under laws of Arizona, capitalization \$3,000,000, shares \$5 par, fully paid; 175,000 issued; outstanding debt, \$75,000. Annual meeting, second Tuesday in October. Company is successor, 1911, of the Arizona-Colorado Belt & Gold Mining & Milling Co.

Property, 21 claims, 420 acres, held by location in the Globe district of Arizona. Ore occurs in a large fissure vein cutting through diabase, quartzite, and limestone, and as contact ores between diabase and sedimentary rocks. The vein striking northeast and southwest, dipping 55°, is reported as 9' wide, proven to depth of 900', carrying 2% copper, 2 oz. silver and \$1 gold per ton, principally as chalcopryite, on 800' and 900' levels. Ore developed above 800' estimated at \$125,000.

Developed by 863' shaft, several short tunnels, and a total of 3,000' of underground work. The 800' level is said to block out 2,000 tons of ore with 18,000 tons of 2½% ore reasonably certain. Assessment work only was done in 1912, but mine was unwatered and work resumed, Sept., 1913.

Equipment includes 100-h. p. steam hoist and 7-drill air compressor. Arizona-Eastern railroad is 1 mile from property, which is well located and has merit.

GIANT-CALIFORNIA MINING CO., LTD. BRITISH COLUMBIA

Probably dead. Letter unclaimed at mine: Rossland, Trail district, B. C. Jay P. Graves, pres.; A. L. White, vice-pres.; Chas. H. Wolf, sec.; Geo. Wooster, treas.; Wm. Yolen Williams, gen. mgr., at last accounts. Organized 1907, under laws of British Columbia, as successor of Giant Mining Co., Ltd., capitalization \$5,000,000, shares \$100 par, in \$400,000 of 7% preferred, and \$4,600,000 ordinary stock. Lands, 2 claims, the Giant and California, adjoining Le Roi No. 2, on Red mountain. The Giant mine has about 500' of workings, and shipped 4,344 tons of ore, before suspending, 1903. The California has a 1,000' tunnel with a 200' winze, that is practically a blind shaft, planned to be sunk to 550'. Equipment includes electric power, with a small hoist and 10-drill duplex Rand air compressor. No trace of operations secured.

GIANT-ECLIPSE CONSOLIDATED MINING CO. COLORADO

Main office: Salida, Chaffee Co., Colo. C. F. Johnson, pres.; Clyde H. Jay, vice-pres. and cons. engr.; F. L. Ream, sec. and gen. mgr. Company organized Sept. 21, 1909, under laws of Colorado, capitalization \$2,000,000, shares \$1 par, fully paid, nonassessable; 1,625,000 issued. Annual meeting, third Friday in January.

Property, 11 claims, 106 acres, in Monarch district, Colo., showing contact deposits of lead-iron, copper, and zinc ores between granite, limestone and quartzite. Deposit runs north and south and dips at 45°. Orebody developed for 50 to 150' width, 1,400' length and 1,400' depth, carries 0.5 to 3% copper, 3 to 25% lead, 1 to 12 oz. silver and 80 cts. to several dollars per ton in gold. Zinc occurs in ore and as clean zinc carbonate. Mine has tunnels, aggregating several thousand feet, developing 100,000 tons lead-iron and 50,000 tons low-grade zinc ore.

GIANT LEDGE GOLD & COPPER CO.**CALIFORNIA**

Office: 500 Frost Bldg., Los Angeles, Cal. Mine office: Barnwell, San Bernardino Co., Cal. L. M. Gregory, pres. and gen. mgr.; H. G. Stoddard, sec.; R. W. Kenny, treas.; Edward Brough, mine supt. Organized July, 1901, under laws of Arizona, capitalization \$1,000,000, increased, 1910, to \$1,500,000, shares \$1 par. Company has kept out of debt.

Property, 30 claims, a 40-acre mill site and miscellaneous holdings giving total area of upwards of 800 acres, in the New York district, about 5 miles from Barnwell, showing 4 veins, of which 2 are under development, one being a fissure in granite, the other a contact deposit between limestone and granite, with average width of 60', giving average assays of 5% copper, 5% lead, 10 oz. silver and \$4.50 gold per ton, from carbonate and oxide ores near surface and sulphides at depth. Mine has 1 shallow shaft and 2 tunnels, longest 992', with about 4,000' workings, developing a considerable amount of ore. Company experimenting with leaching and electric precipitation, having about 50,000 tons of oxidized ores available for this process, which is planned to yield electrolytic copper, with lead peroxide as a byproduct.

GIBOSA MINE.**MEXICO**

Owned by American Smelters Securities Co.; situated at Chihuahua, Mex.

GIBSON COPPER CO.**ARIZONA**

Office: Globe, Gila Co., Ariz. Mine at Bellevue, Gila Co., Ariz. Samuel L. Gibson, pres. and treas.; Wm. Henderson, vice-pres.; F. F. Towle, sec.; Geo. K. Stoneman and J. L. Alexander, directors. Organized 1906, under laws of Arizona, capitalization \$2,500,000, shares \$25 par; issued \$2,000,000. Has authorized a \$500,000 issue of 6% bonds; issued, \$6,000. Total dividends to date, \$80,000. Annual meeting, first Wednesday in March. Property was under lease and option to the Summit Copper Co., Arizona, for 17 months, but reverted to owners, Jan., 1912. This option was for a price of \$442,375, with \$30,000 for an initial payment, and installments of \$1,000 quarterly, ending Dec., 1911, followed by installments of \$4,000 quarterly thereafter, until June 18, 1914, giving total payments of \$91,000, and leaving a final balance of \$351,375 payable June 18, 1914. The bond provided that 20% of net smelter returns, during the first 18 months, be applied on the final payment, after which 10% of net smelter returns be applied on the final payment.

Property leased to Sultan and Wayne until Aug., 1913, working ores with a small concentrator equipped with jigs. In Oct., 1913, property was reported taken over by a new company to be organized by W. H. Mason, J. W. Sanders, J. H. Dieter and Richard Stevens, the last 2 named being attorneys, all of St. Louis, Mo.

Lands, 16 adjoining claims, 7 patented and 8 in process, area 300 acres, about 18 miles west of Globe, with a good wagon road connection. The property includes the Summit, Pasquale, Reynolds and one additional group, of 4 claims each. The Summit, Pasquale and Reynolds were worked in a very small way, by different owners, 1900-06, when taken over by the Gibson Copper Co., and thereafter were worked continuously, until June, 1910.

The country rock is Pinal schist and granite carrying 3 approximately parallel fissure veins, having a northeast strike. The Summit and Pasquale are the principal veins, the former vein, of 4 to 7' width, traceable for the entire length of the property, a distance of $1\frac{1}{4}$ miles. The Summit and Pasquale veins are about 250' apart, the Intermediate vein about 75' east of the Pasquale. Ore occurs in the Summit and Pasquale veins in well-

defined shoots, pitching to the south at 40 to 65°, the lenticular form of these shoots being in some cases due to strike faulting and movement. Ore is mainly massive chalcopryite, with a little bornite. Gangue is quartz with some calcite and small quantities of specular hematite and gypsum. Two veins show high-grade ore and some low-grade ore has been developed in 5 veins. The McKinley vein, undeveloped, shows a strong outcrop.

The Gibson mine was opened by Messrs. Gibson and Henderson, with a capitalization of \$90 cash and a team of horses, but on that extremely limited capital, not only paid its way but earned good profits from grass-roots. The mine has 3 shafts and 5 tunnels, 2 shafts and 4 tunnels being worked. The Pasquale tunnel, driven on the Pasquale vein, is about 200' below the collar of the incline shaft. The Reynolds tunnel is to intersect the vertical shaft at 1,800' from the portal, at depth of 500'; the Toombs tunnel, 100' vertically above and the Upper Toombs tunnel, 210' above the Reynolds, are drifts on the Summit vein. Working shaft is an incline, 600' deep, sunk on the Summit vein, with 6 levels which show that the Summit vein runs N. 21° E., dips 56° northwest, and carries a seam of high-grade ore, the main pay streak carrying 8 to 15" of chalcopryite ore assaying 20 to 30% copper, throughout the various levels. The shaft has 5,915' of workings on the Summit vein, besides drifts on the Pasquale and Intermediate vein, reached by crosscuts on the 3rd and 4th levels.

Development by the Summit Copper Co. was by a vertical 3-compartment shaft, sunk to a depth of 244' by the Gibson Copper Co., and deepened by this company to 573', this depth corresponding with the 7th level of the old incline shaft. About 4,000' of new drifting and crosscutting, costing nearly \$142,000, was also done. The vertical shaft cuts the Pasquale vein at 165', the Intermediate vein at 300' and the Summit vein at 500' depth.

The Pasquale vein differs from the Summit in that it cuts across the bedding of the schist, instead of following the bedding planes as does the Summit, having a strike of N. 20° E., with dip of 35 to 50°. Apparently the Pasquale vein is better defined, more continuous and stronger than the Summit, the fissure being of 5 to 10' width, carrying a pay streak, from a few inches to 3' in width, of ore assaying up to 33% copper. Ore occurs in the Pasquale vein in shoots pitching to the south, similar to the ore occurrence of the Summit.

The Intermediate vein, having drifts of 225' length on the 3rd and 4th levels, has a strike of 12° east, with dip of 52° northwest, and is only about 8" wide, with firm walls and, as developed, is not of great importance, but has possibilities. The ground is heavy and treacherous, requiring timbering for practically every foot of drifting and concrete posts were used. Messrs. Pritchett & Hamilton estimated the developed ore reserves, at the end of 1910, excluding all high-grade ore, and omitting probable ore between the 3rd and 4th levels on the Pasquale vein, as 33,011 tons of ore, averaging 4.36% copper, on the Summit vein; 17,062 tons of 3% copper ore in the Summit filling; 39,860 tons of 2% ore on the Summit dump and 8,578 tons of 6.51% copper ore developed in the Pasquale vein. The development by the Summit Copper Co. proved disappointing; irregular occurrence and insufficient tonnage failing to offset the high-grade ore extracted. C. W. Pritchett, Denver, Colo., consulting engineer, advised the surrender of option after sampling and examining all old workings.

Equipment at the incline shaft includes two 250-h. p. boilers, a 14x16" hoist and a 6-drill Sullivan air compressor. The plant at the vertical shaft includes two 200-h. p. Stirling water-tube boilers, a 16x20" Hendrie & Bolthoff double-drum hoist, good for 1,000' depth and a 10-drill Sullivan

cross-compound air compressor, with a 132' steel smokestack of 42" diameter. The vertical shaft has pumps with capacity of 500,000 gals. daily.

The gross value of ore produced by the Gibson Copper Co., 1906-09, has been estimated at \$1,250,000. It was shipped to the Old Dominion smelter, a distance of about 18 miles, by 10-horse teams, and required careful selection, owing to the extremely high cost of transportation, returning better than 20% copper. Production was 1,106,100 lbs. fine copper in 1906; 3,340,777 lbs. in 1907; 1,270,211 lbs. copper and 2,000 oz. silver in 1908; 667,405 lbs. copper in 1909, and 600,000 lbs. in 1912.

GILA CAÑON COPPER CO.

ARIZONA

H. Stuart Hotchkiss, pres., 214 East St., New Haven, Conn. Mine address: Ray, Pinal Co., Ariz. Milton J. Warner, sec.-treas.; preceding officers, Geo. B. Chittenden and Erroll M. Augur, directors. Organized 1907, under laws of Arizona, capitalization \$1,000,000, shares \$5 par. Is operated as a close corporation. Lands, 16 claims, area 320 acres, known as the Schneider group, in the Banner or Troy district, Gila county, 4 miles from the Southern Pacific railway. Development, by Geo. Chittenden, progressing since Sept., 1912; 1,200 tons of 8.1% copper ore shipped to Copper Queen Reduction Works, Douglas, Ariz.

GILA COPPER SULPHIDE CO.

ARIZONA

Office: 13 Pine St., New York. S. H. Sherman, supt., Christmas, via Winkelman, Ariz. B. P. Cheney, pres.; F. M. Murphy, vice-pres.; A. W. Edwards, sec.-treas.; preceding officers, H. J. Meany, Paul Burks, F. P. Cruice, Sayre McLeod, L. B. Mulhearn, W. G. Bushnell, directors. Company is controlled by B. P. Cheney and F. M. Murphy. Organized 1909, under laws of Arizona, capitalization \$2,500,000, shares \$10 par, nonassessable; \$1,207,900 issued and \$1,000,000 held intact in treasury for bond conversion. Has authorized an issue of \$1,000,000 first mortgage 6-year 6% bonds, convertible into stock, at par, at option of bondholder. Was organized by the Development Company of America, which bought the property from the Saddle Mountain Mining Co., 1909, for \$300,000 in stock and the assumption of the Saddle Mountain bonds, which were scaled down to \$420,000. New company spent \$275,000 in development work at Christmas and paying off floating debts of former owners.

Property consists of 3 groups of claims comprising 54 claims, 1,458 acres, 50 patented, and 640 acres coal land. Holdings include Christmas mine and claims in Banner district, Gila county, and coal, gold and copper claims in the Saddle Mountain district, Pinal county, all within a radius of 6 miles.

The Saddle Mountain group of gold and silver claims, patented, 266 acres, with 3,450' of workings, show base dry ore, with a little lead and zinc and traces of copper, an average of 300 assays showing \$13 per ton in gold and silver values.

There are also 640 acres of patented coal lands, in the lower basin of Deer creek, showing a 3' vein of dirty bituminous coal, developed by a 175' incline shaft and 800' of workings, equipped with a small steam hoist and pump. There is a bee-hive coke oven for testing the coal.

The Christmas mine is at the junction of Christmas canyon with the Gila river, on the north side of the stream, 8 miles from Winkelman. The mine was opened, 1883, but closed, 1884, because found to be located on the San Carlos Indian Reservation, and remained idle until the lands were restored to the public domain, by executive order of the president, Dec. 2, 1902. The property shows heavily bedded white and gray Carboniferous limestone, in various stages of alteration, near a granite porphyry contact. Ore occurs mainly as replacements in limestone, with garnetiferous gangue,

carrying sulphides, mainly chalcopyrite, but with bornite and some copper glance. The contact zone has shown copper ore wherever opened and the porphyry also carries copper ore, below workable tenor. Four main ore-bodies are under development, these ranging from 4 to 60' in width. Ore-body contains nucleal blocks of undigested limestone, surrounded by ore, hence it is difficult to measure tonnage developed. Ore mined gave average assays of about 3% copper and 30 to 40 cts. per ton in combined gold and silver values.

Development at Christmas is by 4 shafts, all showing oxidized and sulphide ores. The No. 3, or main working shaft, is 850' deep; No. 1, 430' deep, shows good ore on the 120' level, said to average 3.75% copper, with considerable heavy sulphide ore on the 300' and 400' levels, latter said to show 5% ore; No. 2 shaft is 215' deep, the Hackberry shaft 165' and Christmas shaft 175' deep. The upper workings have a blanket bed of about 6' thickness, said to be proven for 300' in width and 625' in length. The mine has almost 16,000' of workings, with much ore in sight. Management estimates, Sept. 16, 1913, that 400,000 tons of ore is blocked out or 500,000 tons "in sight." The mine has open cast workings of 30,000 sq. ft. area, showing carbonate ores. Recent work at the mine has been along the porphyry contact on the 800' level.

Mine equipment includes a 90-h. p. steam plant, with 4 hoists of 10 h. p. to 175 h. p. Property will have a 7,000' rope tram in 1913-14.

Production of the Saddle Mountain was 445,000 lbs. fine copper in 1905; 2,338,492 lbs. copper, 16,410 oz. silver and 437 oz. gold in 1906; 1,751,264 lbs. copper, 7,453 oz. silver and 254 oz. gold in 1907. Property, though low in grade, is considered of promise if given further mine development.

Contrary to press reports current, 1913, the Gila Co. does not own the Imperial Copper Co.'s property at Silver Bell and Sasco, Ariz., though a harmony of interests may at some future time lead to a merger of the companies.

GILA MONSTER COPPER CO.

ARIZONA

Mine near Kelvin, Pinal Co., Ariz. Lands, known as the Confidence mine, with 1,000' of underground openings, show auriferous and argentiferous bornite, chalcocite and various oxidized ores. No trace of operations secured. Probably defunct.

GILA MOUNTAIN COPPER CO.

ARIZONA

Idle since 1909. N. W. Ferris, pres., 50 East 21st St., New York. Frank Thorpe, Jos. H. Thoms, F. W. Cowperthwait, and John F. Weber, latter of Safford, Ariz., directors. Organized about 1910, capital \$300,000, shares \$1 par; \$50,000 mortgage authorized April, 1911, ordered foreclosed Jan. 12, to reorganize company.

Owens San Juan mine and Great Eastern group, totaling 24 claims, area 470 acres, in the Lone Star district, Gila mountains, about 30 miles north of Morenci, Ariz. The San Juan mine has a 280' shaft, planned to be sunk to 500', cutting a 28' vein on the 230' level that shows a streak of ore assaying 25% copper and 4 oz. silver per ton. There also are 2 other shafts. A pumping plant, at Walnut Springs, supplies a reservoir at the San Juan mine.

A 50-ton concentrator, built 1906, shipped, 1907, some concentrates to the Old Dominion smelter, 1 carload returning 29.95% copper, about 2 oz. silver and 80 cts. gold per ton. Production, 1907, was 110,858 lbs. fine copper, 223 oz. silver and 6 oz. gold.

Property has had a checkered career; it was first the basis of a swindling promotion that landed the promoters in jail; then worked as a real

mine by John Weber, who made money until the panic of 1907. Present company out of funds and property liable for watchman's wages, etc.

GILA RIVER COPPER MINES CO.**ALASKA & MONTANA**

Probably dead. Letters unclaimed at office in Washington, D. C., and Flint, Meagher Co., Mont. Wm. E. Ambrose, pres.; O. J. Moat, vice-pres.; N. M. Ambrose, sec.; Frank Thos. Evans, treas.; preceding officers, John R. Hill, Hon. M. N. Packard, M. H. Ramage, Gen. Geo. C. Reid and J. A. Howard, directors; W. J. Miller, supt. Organized July, 1907, under laws of Arizona, capitalization \$5,000,000, shares \$1 par, assessable; issued \$3,100,000. Has levied assessments of about \$70,000. Company is said to own a controlling interest in the Howard Copper Co. of Montana. Annual meeting, first Tuesday in July. Lands, 8 claims, area 160 acres, in the vicinity of Flint, little developed, also the Liberty group of gold claims, on Silver Bay, 6½ miles from Sitka, Alaska, having about 450' of tunnel work.

GILES GOLD MINING & MILLING CO.**COLORADO**

Mine at Ward, Boulder Co., Colo. Letter to F. A. Lawrence, owner, at Fairmount, Neb., unanswered. Mine has auriferous and argentiferous copper ore, and is equipped with steam power and a 10-stamp mill.

GILPADO MINING CO.**COLORADO**

Harry T. Willis, superintendent, Central City, Gilpin Co., Colo. Property, the Chase mine, developing a vein of gold-silver bearing copper ore by 500' shaft and levels. Equipment includes steam power. Mine examined by Forbes Rickard, 1910.

GILPIN ORION GOLD MINING CO.**COLORADO**

Office: 522 McPhee Bldg., Denver, Colo. Wm. A. Miller, vice-pres. and gen. mgr.; A. C. Ogle, Jr., sec.; Jas. A. Jones, director. Capitalization \$3,000,000, shares \$1 par. Company is a gold mining concern producing copper in relatively small quantities. Company is mining but little ore, the returns for June being 2¼ tons worth \$105.47 per ton and 2.4 tons of \$17.45 ore, but no stoping is being done. A small and not particularly attractive property.

GINZA COPPER CO.**UTAH**

Office: Logan, Utah. Mine office: Kelton, Box Elder Co., Utah. Harry Hayball, pres.; J. F. Featherstone, vice-pres.; Edw. Korupat, sec.-treas.; Noble Stewart, mine supt. Organized under laws of Utah, capitalization \$100,000, shares 10 cts. par.

Property, a group of claims, 24 miles from Kelton, the nearest railroad station, and 5 miles from Strevell, in the Clear Creek district, Box Elder county, close to the Idaho line. Claims show vein, or contact deposit with flat dip between quartzite and granite. A 3½' zone on the hanging wall carries copper ore with gold-silver values averaging about \$27 per ton in the 3 metals. Principal development is a 160' tunnel with 27' of drifting on the paystreak, and an 18' winze sunk in ore. Company shipped several carloads of ore in the summer of 1913 and will erect a concentration plant in the near future. Mine recently examined by R. R. Vail, of Butte, Mont.

GIRARD COPPER CO.**MONTANA**

George J. Kirby, pres., Willimantic, Conn.; John A. Kirby, vice-pres., Salt Lake City, Utah. Organized 1912, capitalization \$10,000,000, shares \$10 par; 601,120 issued; 501,000 shares pooled until July 1, 1915. Admitted to quotation Boston curb, for 91,020 shares, Jan., 1913.

GIRARD DEVELOPMENT CO.**ARIZONA**

Garrit B. Kip, Girard C. Herrick and E. Hicks Herrick of Butler, Her-

rick & Kip of New York, are chief stockholders. Company considering purchase of Pioneer Smelting Co. plant at Corwin, Pima county, Ariz.

GIRDWOOD MINE.

ALASKA

Address: Latouche Island, Prince William Sound, Alaska. Property, also known as the Girdwood & Barrack mine, is one-half mile north of the Beatson Bonanza mine. It shows an orebody carrying chalcopryite with pyrrhotite and pyrite, about one-fourth mile back from the shore line. The mine has been developed by numerous surface workings and by a long tunnel with stopes, from which several hundred tons of ore have been shipped. Some work was done on the property in 1912.

GIROUX CONSOLIDATED MINES CO.

NEVADA & MEXICO

Office: 1400 Alworth Bldg., Duluth, Minn. Mine office: Kimberly, White Pine Co., Nev., and Carbo, Ures, Sonora, Mexico. Thos. F. Cole, pres.; John Uno Sebenius, vice-pres.; Jos. B. Cotton, vice-pres. and gen. counsel; Edw. J. Maney, treas.; preceding officers, Geo. G. Barnum, Henry B. Paull, Geo. F. Piper, John H. McLean and Ralph C. Lupton, directors; Frederic R. Kennedy, sec.; Frank P. Mills, gen. mgr. in Nevada; S. L. Hestlett, gen. supt. Mexican mines.

Organized April 14, 1903, under laws of Delaware, capitalization \$7,500,000, shares \$5 par, was originally \$5,000,000, increased 1908, to \$6,500,000 and again increased, 1909, to present amount; issued, \$7,207,100, with \$496,400 in the treasury for the conversion and retirement of convertible bonds. Bonds outstanding, \$496,400 first and second issue, at 6%. American Trust Co., Boston, registrar; Boston Safe Deposit & Trust Co., transfer agent. Annual meeting, first Tuesday in February.

The Giroux is now controlled absolutely by the Consolidated Copper Mines Co., through the exchange of most of the stock of the Giroux for that of the new company on a basis of 10 shares for 1, amounting to 75% of the stock issue of the new company. A proposed \$3,000,000 bond issue by the new company will furnish ample working funds.

The Nevada mineral lands, originally 52 claims, patented, area 1,050 acres, were largely increased, 1909-10, by the acquisition of the holdings of the Giroux-Ely Extension Copper Co., which were 130 acres, south of the Giroux Consolidated and east of the Ely-Central; the Rickard-Ely Copper Co. holdings, 5 claims, adjoining the Veteran-Ely on the west; the Military group of 4 claims, adjoining the Giroux, and various other adjoining properties, for which \$226,551.40 was expended in 1909. The main holdings constitute a tract about 2½ miles in length, and one-half to one mile in width, lying immediately west of the Nevada Consolidated. The company also owns 1,800 acres of miscellaneous lands, including the town site of Kimberly, 7 miles west of Ely, and valuable water rights in the Steptoe valley.

The Giroux controls the lands of the Butte & Ely Copper Co. through ownership of 239,175 shares, bought at \$1 per share.

Giroux current assets, Dec. 31, 1911, were \$496,177; in 1912, \$715,073; including metals in stock and ore on dump at Mexican mine, totaling \$367,088. Liabilities are given at \$649,000 in 1912 and \$119,176 in 1911; cash on hand, 1912, \$27,797, as compared with \$157,309 in 1911. Net profit in 1912, after allowing for extraordinary expenses, was \$150,000, or a little over \$1 per ton. Mining expenses, 1912, were \$708,592 compared with \$198,707 in 1911; construction and equipment, \$103,318, against \$70,488 in 1911. Total for 1912, \$811,910, as against \$269,195 the year before.

The Giroux property covers a total area of 2,000 acres, having an extreme length east and west of 15,000' and a maximum width of 4,000'.

It covers an intrusive body of monzonite porphyry and is part of the long mass running through the district, on which the steam-shovel pit of the Nevada Consolidated Co. is working. This porphyry is exposed over a large part of the company holdings, the rest being limestone whose beds dip away from the porphyry. The contacts are silicified with very extensive areas of quartz, stained by iron and copper.

The ore deposits include porphyry, or disseminated ore, similar to that of the Nevada Consolidated Co., and secondly the contact orebodies beneath the outcrop just mentioned. The porphyry orebodies have been developed by churn drill holes in the customary 200' blocks and by underground workings. It is found that the orebodies, together with blocks of barren rhyolite, are faulted and are not continuous throughout the property. These orebodies cannot be worked by steam shovel but are being mined by caving methods. They are mined through 3 shafts, the main ore supply coming from the 205' Morris shaft, now yielding 1,000 to 1,200 tons a day, of 2.24% ore. The Bunker Hill shaft is connected with the above, the main level being 165' beneath the surface. The Brooks incline shaft is used as a stairway for the men and for lowering timber and supplies.

The Bunker Hill-Morris mine contains 7,000,000 tons of 2% ore, according to the rigid estimate of Henry Krumb made, 1913, for the Consolidated Copper Mines Co. Reliable estimates, with allowance for probabilities made by the Giroux engineers and published in the company's report for 1911, gave 10,291,000 tons of 2% ore and for the property as a whole 6,599,000 tons of 1.65% ore. Shipments from the Morris orebody the last 8 months of 1912 amounted to 140,877 tons of 2.15% copper ore. The caving system is now well started at the mine and one blast of 257 holes shot down 20,000 tons ready for loading.

The porphyritic ore is comparatively friable, and readily amenable to concentration, though necessarily somewhat given to sliming. The southern monzonite orebody is about 400' wide, with a proven length of about 2,000' and is 100 to 175' thick. Another monzonite orebody extends along Old Glory hill from the western end of the property, in a course between the Alpha and Giroux shafts. The porphyry orebodies have been tested by 6 Keystone churn drills, and these drills have done considerable work also on the Butte & Ely ground. A large number of holes have been bored, mainly to the depth of about 500', with 1 hole of 1,035' put down, 1909. The lands are so extensive that a comparatively small part of the property has been thoroughly drilled. The first statement given out by the present management, appearing early 1911, estimated 9,620,000 tons of porphyry ore developed, capable of giving a net recovery of 1.36% copper, 20 cts. silver and 40 cts. gold per ton. As estimates of net recovery are subject to change it would be better to give the average assay. The management in this statement to shareholders reported the following bodies of porphyry ore: 4,200,000 tons in the orebody north of Butte & Ely, predicated on 13 holes, with overburden of 65 to 210' depth, and an average of 108', carrying 15 to 130' of commercial ore, with an average of 79', ranging 0.81% to 1.38%, with an average of 1.11% copper tenor, these figures being an estimate for net recovery and not assay values. The Morris orebody of 2,270,000 tons is calculated, 1910, upon 16 drill holes, 2 showing no overburden, others with overburden 30 to 270' in depth, with an average of 82', showing 20 to 230' of commercial ore, with an average of 127', assaying 0.92 to 3.62%, average of ore given at 1.7% and at 1.3%. The Bunker Hill orebody is estimated at 2,380,000 tons, with an average of 114' of capping and 120' of ore, with average of 1.65% copper. Company

also estimated 650,000 tons of 1.61% concentrating ore on Old Glory Hill, and 120,000 tons of 3.5% smelting ore in the Old Glory mine.

Development work for 1910 included 72 churn drill holes, averaging 274' in depth, with a total of 19,725' of holes, costing \$34,723, an average of \$1.76 per foot. In 1912 company did 7,887' new work on main (165') level, 8,521' on 135' sub-level, and 1,925' on 105' sub-level, with 5,927' cleaning and retimbering drifts and 366' retimbering shafts.

The Alpha mine is an independent orebody, having a zone, or lode, several hundred feet wide of mineralized, silicified limestone along the porphyry contact. This deposit is thoroughly leached from the surface downward almost to the water level 1,000' below. The orebody so far developed is 400' wide on the 1,000' and 1,200' levels, and is several hundred feet long. It has not been found on the 700' level, though that drift shows the formation to be 360' wide by 520' long; 230 tons of the ore from this deposit shipped in 1913, assayed 8.77% copper. The mine has 2 shafts, the Alpha 1,200' deep, and the Giroux 1,450' deep.

The 1,200' three-compartment Alpha shaft formerly was the principal working under the old management, but caved, Jan., 1908, entailing a severe loss, and rendering the sinking of a new main shaft necessary. The Alpha is about 800' from the Cumberland-Ely mine, and is connected with the Giroux shaft on the 770' and 1,200' levels. The Alpha has been retimbered, and put in as good order as possible, but practically is now only an air-shaft, and an extra exit from the mine. The Alpha mine makes about 100,000 gals. of water daily, and the former management foolishly figured on running a concentrator with water from this shaft.

The 1,450' vertical Giroux shaft, 700' west of the Alpha, formerly had only 2 compartments, but, owing to the caving of the Alpha, under the old management, the Giroux has been made the main shaft. The shaft is 12x19' 4" in the clear, with 5 compartments, these being a 10x5' 8" compartment having a double-deck cage to handle men and timber, with capacity for 35 men; 2 skip compartments, each 5x5' 6", and 2 compartments for pipes and ladderways, each 5x4' 6". Timbers are unusually heavy, being 12x14", with wall plates 20' long, and 12x12" and 14x14" end plates. The shaft was sunk through solid limestone, at the rate of 120' per month, a record for Nevada shaft work, almost exclusively by raising, at an average cost of \$71.25 per ft. The Giroux shaft made very little water while in the limestone, but became wetter when bottomed, and is equipped with unusual pumping facilities, having 2 pumps of 600 gals., and 1 of 1,200 gals. capacity per minute. The main pumping station, on the 1,200' level, is finished with cement, requiring about 1,000 tons of material. The 1,200-gal. Prescott cross-compound condensing pump is one of the largest underground engines ever built, and has a 7-ton fly wheel, with a 16" discharge pipe. The pump station is 40x120' in size, with sides and ends concreted, having a height of 17' 6" to the concrete arch, the concrete averaging 30" in thickness. The ore station on this level is 20x22', and 11' high, timbered with 14x14" creosoted Oregon fir.

The principal mining equipment is at the Giroux shaft, which has a 94' steel headgear, with two 12' sheave wheels. The engine house and boiler house are 400' from the shaft. The engine house, 47x120', of steel frame, ironclad, with solid cement floors, has a 26x48" Allis-Chalmers duplex-cylinder hoist having a 10' drum with 9' face, capable of handling 5-ton skips in counter balance to depth of 2,000', at a hoisting speed of 1,500' per minute. There also is a 20x48" Allis-Chalmers hoist for the cage. Part of this equipment was moved to Morris No. 2 shaft in 1912.

A 3-mile private railway, connecting the principal shafts with the

Nevada Northern line, has grades averaging about 1.5%. Equipment includes a Porter engine, of 600 tons tractive power, and 75 Ingoldsby ore cars.

A \$160,000 mill erected in 1907 proved a failure owing mainly to lack of water and has not been operated by the present management. It is described in Vol. X.

The company owns the water rights to Steptoe creek, 9 miles from the mine and 967' lower.

The Sultana mine, the Mexican property, area 459 acres, includes the San José mine, about 1 mile west of Copete, in the Sierra de Oro, 25 miles east of Carbo and about 35 miles from Hermosillo. Property shows a contact vein of 50 to 100' width, between limestone and porphyry, opened by 3 shafts, No. 1, 200', No. 2, the main working shaft, sunk on an incline, 1,200' deep, and the San José shaft 500' deep. The San José mine shows, in the bottom level, a vein of about 40' width, carrying oxidized ores to shallow depth, succeeded by sulphides. About 15% of the ore hoisted from the San José was of smelting grade, balance, of 6% estimated copper tenor, being stocked. The Mexican property as a whole shows low-grade copper ore with fair gold value. The shipments of Sultana ore to El Paso smelter have returned combined gold and silver values ranging from 92 cts. to \$734.36 per ton.

The Sultana mill is said to be an utter failure. It was designed to have a daily capacity of 100 tons and has Huntington mills, an amalgamation plant and a cyanide plant. The smelter, purchased after the failure of the mill, remains resting at the railway station, because a competent metallurgist reported that the ore could not be profitably smelted. The mine produced about \$250,000 from enriched oxidized ores which gave out and exploration and development costing about \$500,000 to the end of 1907 developed only low-grade ore which the critics say is neither millable, smeltable nor profitable. The mine has been inactive since 1907 but maintenance expenses during these years of idleness have been quite heavy.

The Giroux has been a disappointment to its stockholders from the beginning, the many promises made by the old management were never kept and the optimistic press reports of later years have not been sustained by results. The company is now practically merged with the Consolidated Copper Mines Co. by the exchange of over 80% of its stock, the merger being an exchange of stock and not a sale of the property. The merger is believed to be a good thing for the stockholders as by an amalgamation of properties the mines may be worked on a large scale and thereby made profitable. Experience has shown that low-grade ores of this character can only be profitably worked on a scale of at least 1,000 tons a day and this the new company will be able to do. Excessive freight rates on the railroad and smelter charges at Steptoe prohibit local treatment by another company and developed tonnage of Giroux alone would not warrant independent reduction plants.

GLACIER PEAK MINING CO.

WASHINGTON

Office: Roslyn, Kittitas Co., Wash. Mine near Lucerne, Chelan Co., Wash. Christopher Menneghel, superintendent. Owns a group of claims near Glacier peak showing fissure veins carrying copper ore. Developed by tunnel. Employs about 15 men when operating.

GLADHAUGH MINE.

ALASKA

Owned by Ellamar Mining Co., at Ellamar, Prince William Sound, Alaska.

GLASGOW & WESTERN EXPLORATION CO., LTD.

NEVADA

Office: 33 Renfield St., Glasgow, Scotland. Sec. and office: H. O.

Jackson, 317 McCornick Bldg., Salt Lake City, Utah. Mine office: Golconda, Humboldt Co., Nev. Geo. McFarlane Reid, chairman; Joseph Ralph, London, managing director; A. P. Stanley Macquisten and E. S. Coats, directors; Otto Stalman, mgr.; Joseph Farren, mine supt.

Organized Oct. 28, 1896, under laws of Great Britain, capitalization £30,000, increased 1898 from £6,000, shares £1 par, fully issued and fully paid. Accounts to Oct. 31, 1911, published June 21, 1912, showed debit, £48,829 of profit and loss account. Cash on hand, £2,022; money loaned Adelaide Star mine, £667,402; shares held, £3,835; creditors, £3,790; temporary loans and accrued interest, £734,322. This company is a parent concern to the Adelaide Star Mines, Ltd., and also owns the Copper Canyon and Copper Basin group of claims in Lander county, Nev., and the Montreal group in Beaver county, Utah. The Adelaide Star Mines, Ltd., owns the Adelaide group of claims near Golconda and the Star group at Cherry Creek, both in Nevada.

A large sum of money, approximating \$5,000,000, has been spent on these properties in the last 15 years and on April 1, 1913, debts against the company amounted to over \$95,000. The English managers sent a representative to settle up the claims and to avoid bankruptcy compromised with the creditors for 40 cts. on the dollar. The money spent was used for the erection of smelters, concentrators and leaching plants, when underground development had not yet shown sufficient ore reserves to supply the reduction plant. The 2 Nevada properties and a small railway in that state, together with the Montreal mine in Utah, were attached as the result of a suit for \$2,250,000 brought by Peter Coats, of the J. & P. Coats Thread Co. of Scotland, for money advanced to the company.

At present a reorganization of the company is under way and it is expected that this fall will see a resumption of mining at the Montreal, Copper Basin and Copper Canyon properties, since all 3 possess sufficient merit to justify expensive development, though little mining of ore can be done at present. The management expects to sink an 850' 3-compartment shaft down to water level on the Montreal property and a second shaft to depth of 500'. The various claims are now being surveyed for patent, since despite the enormous expenditure in the past, title has never been obtained to the land.

GLENWOOD MINING CO.

UTAH

Office: 1102 West Seventh South St., Salt Lake City, Utah. Mine office: Salt Lake City, Utah. Abel Grovenor, pres.; E. P. Mowers, vice-pres. and gen. mgr.; M. L. Grovenor, sec.-treas. Organized Feb. 21, 1901, under laws of Utah, capitalization \$30,000, shares 10 cts. par, assessable; increased 1912, to \$125,000, shares 25 cts. par. Lands, 8 claims, one patented, in Big Cottonwood district, 6 miles from a railroad, opened by shafts and tunnels, with about 1,600' of workings.

GLOBE, ARIZONA & EL PASO COPPER MG. & SM. CO. ARIZONA

Idle. Mine at Globe, Gila Co., Ariz. David G. Baldwin, pres.; W. D. Mayfield, sec.; W. H. Anderson, treas.; John O'Keefe, managing director, at last accounts. Organized 1910, capitalization \$3,000,000, shares \$1 par. Lands, 45 claims, in 2 groups, 10 miles northwest of Globe, held under bond and lease. The Dixon group of 20 claims, held under bond from the Dixon Copper Co., is 9 miles from Globe, at the foot of the Sleeping Beauty mountains. The other group, 25 claims, is held under bond from Matteo Giacomo. The Dixon group has 300' and 400' tunnels, showing ore assaying up to 18% copper, in Globe limestone and quartzite, capped in some places by diabase, and the property shows several small iron blowouts. The Dixon has bunk houses. Was developing, 1911.

GLOBE & LOST GULCH SILVER-COPPER MINES CO. ARIZONA

Office: 424 McPhee Bldg., Denver, Colo. Mine at Lost Gulch, Gila Co., Ariz. M. E. Brooke, pres. and gen. mgr.; John A. Myrberg, vice-pres. and supt.; H. A. Wimbush, sec.-treas. Organized April 1, 1907, under laws of Arizona, capitalization \$1,000,000, shares \$1 par, non-assessable. Lands, 10 claims, patented, and other locations, area 180 acres, and a mill site at the head of Lost gulch, 1½ miles north of Inspiration and Miami, Ariz., showing quartzite, granite and limestone, cut by porphyritic dikes.

Development shows lead ore in diabase, silver-chloride ore in granite and limestone and copper silicate ore in dacite.

GLOBE MINING CO.**ARIZONA**

Office: 606 Schiller Bldg., Chicago, Ill. Mine office: Globe, Gila Co., Ariz. Hon. J. F. Hechtman, pres. and gen. mgr.; M. A. Patterson, vice-pres.; Walter M. DeKalb, sec.; Geo. L. Beach, treas.; preceding officers, F. B. Walker, L. E. West and R. A. Jamison, directors. Organized Feb. 19, 1903, under laws of Arizona, capitalization \$2,500,000, shares \$1 par. Property leased to Mineral Farms Co. in 1911 and was being developed in 1912.

Lands, 21 claims, patented, area 335 acres, 2½ miles north of Globe. Lands show granite-porphyry, syenite, quartzite and diorite, carrying fissure veins in diorite of 2 to 100' width, with gossans giving assays of 2 to 6% copper, 4 to 30 oz. silver and \$2 to \$28 gold per ton. The Mineral Farm group of 21 claims, 3 fractional, includes the Vacey-Constance mine, worked 1886 for silver, and said to have produced upwards of \$100,000 worth of ore under former ownership, this group having upwards of 20 old pits and shafts, of 10 to 165' depth. The Mineral Farm group shows altered sedimentary and igneous rocks, with iron dikes and a complex fissure system. The Mineral Farm vein, of about 4' width, gives assays of 4.8% copper and up to 132 oz. silver and \$7.44 gold per ton, and the group also shows a 20' vein, said to sample 22% copper, 9% zinc, 2 oz. silver and \$4.96 gold per ton, which seems excessive. The Eagle Pass group has a 215' two-compartment shaft, between 2 iron outcrops.

Equipment includes a 60-h. p. boiler, 8x10" hoist and an air compressor. There are 6 mine buildings.

GLOBE MINING CO.**MICHIGAN**

Office: 15 William St., New York. Jos. E. Gay, pres.; J. R. Stanton, sec.-treas.; preceding officers, R. D. Rickard and W. H. Leggett, directors. Organized May, 1911, under laws of Michigan, capitalization \$78,250, shares \$25 par; fully paid and fully issued.

Lands, 3,200 acres, being Secs. 1, 2, 3, 4 and 5, T. 53 N., R. 35 W., extending entirely across the Keweenaw trap formation, from the eastern to the western sandstone. Property lies next south of the Champion, and immediately north of the Challenge, carrying about 6,000' of the strike of the Baltic and all parallel beds. Mine was developed by the Copper Range Consolidated Co., under option, but option was relinquished, Feb. 1, 1909, after the expenditure of upwards of \$500,000.

Diamond-drill borings, to locate the Baltic bed, gave some cores with excellent values, but disclosed a heavy overburden of sand and boulders, rendering it necessary to reach the solid rock by a vertical shaft. Work was begun early 1905, but the first shaft was abandoned, owing to quicksand, and was replaced by a new vertical shaft, about 700' south of the Champion boundary. The shaft is telescopic, inside measurements of timbers at the collar being 13' 3"x23' 3", with a second section below of 9x19' 6", and a third section of still smaller size.

The shaft is 1,040' deep, with first level 356' below surface, and plats

were cut thereafter at 100' intervals. The Baltic amygdaloidal bed was tested by some diamond-drill boring, and about 900' of drifting on the seventh level, which is about 1,000' from surface, and showed a little copper, in patches, but on the whole was unpayable, and work was suspended Jan. 31, 1909, and property has been idle since. Notwithstanding the unfavorable results secured by the work done so far, the property is by no means devoid of promise.

GLOBE-RAY DEVELOPMENT CO.

ARIZONA

John C. Gibson, supt., Miami, Ariz. This is a development company having a lease and bond on the Independence or Goodwin mine, 14 miles southwest of Miami on the trail to Ray. The claims show a well-defined but small vein in Pinal schist carrying copper ore that runs about 7% copper, 4 oz. silver and \$4 gold per ton. The vein is opened by a 280' inclined shaft on the vein with 600' of drifting on the 4 levels. The ore is packed on burros 3 miles to the summit of the Pinal mountains, thence 9 miles by wagon road to the railway. Three cars of ore were shipped to the Old Dominion smelter late in 1912.

GLOBE SMELTING & REFINING CO.

COLORADO

At Denver, Colo. Controlled by American Smelting & Refining Co., and described under title of that company.

GODIVA MINING CO.

UTAH

Office: Kearns Bldg., Salt Lake City, Utah. Mine office: Eureka, Juab Co., Utah. Edw. Packard, vice-pres. and gen. mgr.; J. E. Berkley, sec.; L. S. Hills, treas.; Jackson H. McCrystal, supt.; preceding officers and Robt. Harkness, directors. Capitalization was increased, 1908, from \$100,000 to \$1,000,000, shares \$1 par. It is related to the Gemini Mining Co., and operated as a close corporation, has paid dividends, but figures are not made public. The mine is one of the pioneers of the Tintic district, and was once a notable producer. Mine, carrying gold-silver bearing copper and lead ores, has a shaft 1,000' deep, with steam power. Presumably idle.

GODIVA-SIOUX MOUNTAIN MINING CO.

UTAH

Idle. Letters unclaimed at Eureka, Juab Co., Utah. B. N. C. Scott, pres. and gen. mgr., at last accounts. Organized March 4, 1901, under laws of Utah, capitalization \$150,000, shares 15 cts. par, non-assessable; issued, \$105,000. Lands, 35 acres, patented, adjoining the Plutus mine, showing 2 fissure veins, having lead and copper ores, carrying 20% lead, up to 40 oz. silver, and \$4 to \$5 gold per ton. Development is by the Smuggler tunnel.

GOLCONDA-NEVADA COPPER CO.

NEVADA

Idle. Mine office: Golconda, Humboldt Co., Nev. J. H. Playter, supt., at last accounts. Property is in the Winnemucca region and comprises the Etchert & Gomes group, bought 1907, and a two-thirds interest in the Honolulu group, balance of which is owned by the Silverfields Mining Co., Ltd., a reorganization of the Golconda Consolidated Co. The Honolulu group has a short tunnel, shallow shaft and several opencuts.

GOLD BELT DEVELOPMENT & REDUCTION CO.

ARIZONA

Former address: Morenci, Graham Co., Ariz. Sold, 1911, to Eagle Gold & Copper Mining Co., which see.

GOLD BOND MINING & MILLING CO.

UTAH

Office: 27 Latimer Bldg., Salt Lake City, Utah. Mine office: Tooele, Tooele Co., Utah. Mark Stanley, pres.; H. J. Jones, vice-pres.; Wm. Crome, sec.-treas. Organized 1898, under laws of Utah, capitalization \$25,000, shares 5 cts. par, assessable; has levied 9 assessments. Lands, 2 claims, unpatented, 4 miles from a railroad, having a shallow shaft and short tunnel, with about 300' of workings. Is merely a prospect reported to have good showings.

GOLD CHAIN MINING CO.**UTAH**

Office: Provo, Utah. Mine at Robinson, Juab Co., Utah. C. E. Loose, pres. and gen. mgr.; J. T. Farrar, vice-pres.; P. G. Peterson, sec.-treas.; preceding officers, G. Simmons and John R. Turloes, directors. W. D. Loose, asst.-mgr. Organized Dec., 1910, under laws of Utah, capitalization \$250,000, shares 25 cts. par. Paid \$70,000 dividends 1912, making total to date of \$100,000. Company absorbed the Ajax Mining Co., said to have paid upwards of \$1,000,000 in dividends.

Property includes the Gold Chain group and the Ajax mine in the Tintic district. Recent development on the 300 to 700' levels has shown an orebody 20 to 40' wide and 100 to 400' long, which averages 5 to 7% copper, 8 to 10 oz. silver, and \$2 to \$3 gold per ton. Development from the Lower Mammoth mine into the west end of property, 900' below the deepest previous work, has disclosed another orebody which is said to carry 3% copper, 44 oz. silver, and \$2.50 gold per ton. Production is about 100 tons per day, mainly from the largest ore shoot ever opened on the property, which is now being mined on the 700' level. Ore shipped is medium grade, carrying copper with gold and silver values, averaging \$20 per ton after rough sorting.

GOLD CLIFF MINING CO.**WYOMING**

Idle. Letter unclaimed at Sundance, Crook Co., Wyo. Wm. McMillan, gen. mgr., at last accounts. Lands, 14 claims, Kirwin district, carrying several veins of ore giving good assays in copper, gold and silver.

GOLD & COPPER DEEP TUNNEL M. & M. CO.**NEW MEXICO**

Idle. Office: Beaver Falls, Beaver Co., Pa. Mine office: Elizabethtown, Colfax Co., N. M. A. T. McIntyre, pres.; Jas. E. Glasson, vice-pres.; W. H. Martin, sec.-treas.; W. P. McIntyre, gen. mgr. and supt.; preceding officers and Geo. E. Dachtler, directors. Organized Oct. 10, 1900, under laws of New Mexico, capitalization \$200,000, increased 1912 to \$500,000, shares \$1 par, nonassessable; issued, \$225,000. Annual meeting, third Tuesday in July.

Property is in the heart of Cimarron range, on the west slope of Baldy mountain, 12,500' high, and comprises 13 claims, 260 acres, in the Moreno district, 18 miles from the St. L. R. M. & P. R. R. at Ute Park. Orebody a contact between slate and monzonite. Developed by 2 shallow shafts and a 2,300' crosscut tunnel, planned to penetrate the mountain with a final length of 3,500', cutting 2 bodies of low-grade copper ore. Underground work to June, 1913, totaled 3,100'. Equipment includes a 12-h. p. gasoline air compressor and 10 buildings. The 20-ton stamp mill has a 5' Huntington mill and gravity stamps. See U. S. Geol. Survey Prof. Paper, 68, p. 95, for geology of this district.

GOLD CROWN MINING CO., LTD.**MONTANA**

Idle. L. P. Wolfe, sec., Wallace, Idaho. Mine near St. Regis, Missoula Co., Mont. A. A. Mayo, Henderson, Mont., pres. Capitalization \$1,000,000, shares \$1 par. Lands, 5 claims, 7 miles from a railroad, showing a vein said to be 7 to 15' wide between quartzite and diabase, carrying ore giving assay values in copper, silver and gold. Development is by 125' and 500' tunnels.

GOLD HILL CONSOLIDATED CO.**NORTH CAROLINA**

Office: 30 Broad St., New York, N. Y. Mine at Gold Hill, Rowan Co., N. C. Walter Geo. Newman, pres.; Edward H. Swan, Wm. F. Woodbury, Woodruff Leeming, Chas. S. Stacy, J. C. Kemp and W. F. Lanigan, directors. Organized 1910 as successor of Gold Hill Copper Co., a notorious promotion that caught many Wall Street operators. New company, under same management, became bankrupt and property sold at auction, Jan. 27, 1910, for \$45,000. Company does not own the adjacent Union Copper mine.

The mining property consists of 1,050 acres in Rowan and Stanley

counties, the Gold Hill mine, where gold was discovered, A. D. 1799. Gold quartz veins were discovered 1831, and in 1845 this mine was the largest gold producer in the United States. Development is by 2 working shafts of 615' and 830', and 2 lesser shafts. The mine was operating in 1913, cross-cutting on the 270' level to cut the "Newman" vein, already opened on the 800' level. Shipments to the Perth Amboy smelter returned 1.5% copper and about \$3 gold per ton, with small silver values. Copper occurs in minute particles of chalcopyrite in hard quartz schist and recovery by wet concentration is not commercially profitable. Equipment includes ten 100-h. p. boilers and a 10-stamp mill.

This company and its companion, the Union Copper Mining Co., enjoyed decidedly checkered careers. Operations conducted on a considerable scale, 1901-1903, were unsatisfactory and failed to show up the much advertised orebodies. A receivership ensued which was ended early 1906, but a receiver was again appointed, Aug., 1906, for the old company, on the application of Walter Geo. Newman, the former president, on claims aggregating \$352,000. Mr. Newman apparently has used this property solely for stock-jobbing purposes. The property itself is considered worked out and low grade, but worthy of some drilling in depth. At best the company could never pay honest dividends on its capitalization and under its present president cannot be regarded as worthy of any confidence whatever.

GOLD KING LEASING CO.

COLORADO

Otto Mears and Jas. H. Slattery, lessees. Mine at Gladstone, via Silverton, San Juan Co., Colo. Property, the Gold King and Sampson mines, formerly owned by the Gold King Consolidated Mines Co., reorganized as New Gold King Mines, also dead.

Claims have fissure veins carrying shoots of lead-copper ore with gold-silver contents. Development by 600' shaft and 3,000' tunnel. Equipment includes complete steam and electric power, compressor, 300-ton mill, 80 stamps, etc.

GOLD LEAF CONSOLIDATED MINING CO.

IDAHO

Louis Bolduc, Kellogg, Idaho, mgr.; Fred N. Davis, pres.; W. J. Parks, vice-pres.; Vince A. Day, sec.-treas. Company owns Gold Leaf, Copper Belt and Washington claims, near Wallace, Idaho, all in the lead belt, but showing tetrahedrite (gray copper) ore. Twenty-two tons were shipped 1913, carrying 25% copper, 8 oz. silver, and \$1.20 gold. Has 480' drift tunnel on vein.

GOLD LION MINES CO.

COLORADO

Idle.. Letters unanswered from Red Mountain, Ouray Co., Colo. H. Y. Russell, supt., at last accounts. The mine has lead and copper ores and is equipped with steam power.

GOLD MINING CO.

COLORADO

Mine office: Silverton, San Juan Co., Colo. W. Harrington, supt. Property includes the Copper Belt mine, acquired 1911, located in Whitehead gulch, a former large producer of high-grade gold-copper ore. The tunnel, started to unwater the old workings, now 500' long, will be extended to cut the Lincoln vein, also carrying high-grade copper-gold ore. Property also includes the Mabel and Ariadne mines, carrying auriferous and argentiferous copper ores. Equipment includes a water-power plant and a small Leyner air compressor.

GOLD MOUNTAIN MINES.

NEVADA

Properties, owned by William Lundgren, situated about 13 miles from Bonnie Claire and 6 miles from Hornsilver, Nev., include the White Horse claim adjoining the Tokop mine. Veins are silver-gold deposits carrying

copper. An outcropping ore shoot yielded, June, 1913, one ton of ore carrying 236 oz. silver, \$19.20 gold, and $7\frac{1}{2}\%$ copper.

GOLD MOUNTAIN MINING CO.

WASHINGTON

Mine near Berlin, King Co., Wash., comprises 3 claims on Kelly creek, in Index district, showing fissure veins in granite with gold-copper ores opened by about 2,200' of tunnels. Assays, Oct., 1912, said to show 5.4% copper with 22% lead, 18 oz. silver, and \$2 gold per ton.

GOLD NUGGET MINING & MILLING CO.

WYOMING

J. D. Woodruff, superintendent, Shoshoni, Fremont Co., Wyo. Property, the Gold Nugget mine, showing a vein with gold-copper ore, developed by shaft and tunnel work. Equipped with gasoline engine and plans to install stamp mill and cyanide plant 1914.

GOLD QUEEN MINING CO.

COLORADO

Idle. Office: Room 408, 40 Dearborn St., Chicago, Ill. Mine office: St. Elmo, Chaffee Co., Colo. C. Kirchner, pres.; A. J. Stark, supt., at last accounts. Capitalization \$100,000. Lands, 13 claims, on Baron mountain, in the Chalk Creek district. Mine has several tunnels, longest 500', with 900' of workings, developing a strong vein carrying copper ores with gold and silver values. No returns secured.

GOLD STAR MINING CO.

WASHINGTON

Office: 2107 E. Madison St., Seattle, Wash. Mine at Index, Snohomish Co., Wash. Aden Fraser, pres.; John Edmond Praul, sec.-treas. and gen. mgr., at last accounts. Organized 1903, under laws of Washington, capitalization \$1,000,000, shares \$1 par. Lands, 6 claims, area 120 acres, well timbered, in the Index district, 4 miles from the Great Northern railway, showing a 6' fissure vein in syenite, giving assays of 7% copper and \$1.20 gold per ton, from bornite, and \$25 gold per ton from an oxidized quartz capping. No returns secured.

GOLD TUNNEL & RAILWAY CO.

COLORADO

Idle. Mine near Howardsville, San Juan Co., Colo. Jas. E. Merry, mgr.; Ora Kirk, supt., at last accounts. Owns Highland Mary mine, which has ore yielding up to \$100 per ton in copper, lead and silver values.

GOLDEN BELL MINING CO.

ARIZONA

Idle. Mine at Kelvin, Pinal Co., Ariz. L. W. St. Charles, pres.; Geo. H. Sarrick, vice-pres. and gen. mgr.; G. L. Sarrick, sec.; L. C. St. Charles, treas., at last accounts. Organized 1910, capitalization \$1,000,000. Lands, 9 claims, near the Southern Pacific railway, 5 miles west of Kelvin, showing auriferous copper ore.

GOLDEN CURRY CONSOLIDATED MINING CO.

MONTANA

Succeeded by Elkhorn Mining Co., Jan. 15, 1913, which see.

GOLDEN EAGLE GOLD MINING CO.

CALIFORNIA

Presumably idle. Office: 54 First St., Portland, Ore. Letter unclaimed at Copley, Shasta Co., Cal. R. J. Jennings, pres. and gen. mgr.; R. A. Martin, vice-pres.; Jas. E. Isaacs, sec.; C. C. Bush, Jr., treas.; preceding officers, A. Newlands and I. Theodore Jennings, directors. Organized under laws of Arizona, capitalization \$1,000,000, shares \$1 par.

Property, the Keystone group, 3 miles from Keswick smelter, comprising 8 claims, area 160 acres, held under bond and lease, on the eastern side of the Sacramento river, 10 miles northeast of the Iron Mountain mine. Property, developed by tunnel, is in the Shasta County copper belt and has small and rather lean orebodies with surface enrichments workable for gold. Company claimed to have 5 gold-bearing quartz veins, of 2 to 20' width, assaying \$5 to \$20 gold per ton, and a copper vein, claimed to be 6 to 50' wide and traceable 2,200', carrying ore of 5 to 22% copper tenor, with \$1.50 to \$7.80 gold per ton, which figures are considered excessive.

GOLDEN GLOW MINING CO.**IDAHO**

Wm. Schultz, superintendent, Ketchum, Blaine Co., Idaho. Property shows a deposit of low-grade silver-lead-copper ore developed by tunnels. Operated intermittently in 1912.

GOLDEN LINK CO.**NEW MEXICO**

Mine office: Jackson, Grant Co., N. M. Property, 8 claims, along the Big Dry canyon, 6 miles from Jackson, in the Cooney, or Mogollon district, Socorro Co., N. M. J. G. Barnesdale, Superior, Wis., treas. Development by 3 tunnels, lowest 120' long, and a vertical shaft, all in ore, vein being 8' wide. Equipped with 100-h. p. water-power plant, 3-stamp mill and 500' tram.

GOLDEN SMELTER.**COLORADO**

Owned by North American Smelter & Mines Co., at Golden, Jefferson Co., Colo.

GOLDEN SOVEREIGN MINE.**BRITISH COLUMBIA**

Mine office: Aspen Grove, Cariboo district, B. C. Mine, located 1887, has a 100' shaft, said to give a strong showing of native copper. Camp actively prospected in 1912-13 and property presumably drilled.

GOLDFIELD-ANACONDA COPPER CO.**NEVADA**

Mine at Lida, Esmeralda Co., Nev. Col. O. P. Posey, pres.; W. F. Mitchell, vice-pres. and treas.; J. F. Mitchell, sec., at last accounts. Organized under laws of Arizona, capitalization \$1,000,000, shares \$1 par, non-assessable. Nine claims, unpatented, showing gold and copper ore, developed by shallow shafts.

GOLDFIELD BLUE BELL MINING CO.**NEVADA**

D. S. Johnson, superintendent, Berlin, Nye Co., Nev. Property, the Berlin group, whose veins carry gold and silver-bearing lead-copper ores, developed by a shaft. Equipped with steam hoist, air compressor and a 30-stamp concentrating mill.

GOLDFIELD CONSOLIDATED MINES CO.**NEVADA**

Office: Goldfield, Nev. Geo. Wingfield, pres.; J. D. Hubbard, vice-pres.; A. H. Howe, sec.-treas.; J. F. Thorn, gen. supt.; J. H. Mackenzie, cons. engr.; Albert Burch, E. M., gen. mgr., San Francisco; John Mocine, asst. mgr.; Jos. H. Hutchinson, mill supt.; Geo. H. Elder, purch. agt. Organized Nov. 13, 1906, under laws of Wyoming, capitalization \$50,000,000, shares \$10 par; issued \$35,591,480. Dividends to date, \$6.70 per share, or a total of \$23,839,067. Guarantee Trust Co., New York, transfer agent; also company office, Goldfield. Empire Trust Co., New York, and J. F. Cook & Co., Goldfield, registrars. Annual meeting third Monday in March. Company is a merger of Goldfield-Mohawk, Red Top, Jumbo; Laguna Goldfield, Goldfield and Combination mining companies. In 1911, company acquired Vinegerone Fraction and the Bull Dog and Jumbo Fractions. Company owns entire stock of the Goldfield Consolidated Milling & Transportation Co. and 25% stock interest in the C. O. D. Consolidated Mining Co.

Property consists of 380 acres at Goldfield, Nev., with 4 working shafts, Combination, Mohawk, Red Top and Clearmont, all development being done from the latter shaft. Mines show veins with irregular streaks and orebodies in which the commercial limit of ore is not dependent upon

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structural planes, orebodies swelling out and pitching with but slight relation to the vein walls. Estimated ore reserves, Jan. 1, 1913, 300,000 tons of good grade and a large tonnage of low-grade ore. Development for 1912, 48,146'. Equipment includes 100-stamp mill treating 850 tons per day, 1,000-ton cyanide plant, etc., employs 500 men.

Company is the largest gold mine in the world, but produces a large amount of copper ore from one of its veins, the ore being shipped to the Mason Valley smelter at Wabuska, Nev. Production for first 6 months of 1913 was 200,365 tons of ore with net earnings of \$1,967,297.

GOLDFIELD MERGER MINES CO.

NEVADA

John Mocine, superintendent, Goldfield, Esmeralda Co., Nev. Property, the St. Ives and Velvet groups, showing veins with shoots of copper-silver-gold ore, developed by 1,750' of shaft work. Equipment includes electric power and air compressor.

GOLDFIELD MINES OPERATING CO.

NEVADA

Office: Goldfield, Esmeralda Co., Nev. B. F. Thomas, mgr.; J. K. Turner, supt. Is operating under contract the properties of the C. O. D. Consolidated Mining Co., including the C. O. D., Gold Bar and Victor groups, 88 acres at Goldfield. Property developed by shafts and equipped with electric power, employing 25 men, at last accounts. Property is essentially a silver mine which has opened up a new body of \$17 milling ore on the 200 and 300' levels between the 2 shafts, which carries a high percentage of copper in addition to gold. This vein will be explored further on the 700' level of the Blue Bull mine eastward.

GOLINSKY MINING CO.

CALIFORNIA

Idle. Mine near Kennett, Shasta Co., Cal. George Bayha, pres.; W. D. Tillotson, vice-pres. Sold to the Golinsky Copper Co. in 1911. Guggenheim interests held \$100,000 bond on property in 1907. Property, 14 claims, adjoining the Mammoth mine on the east and 4 miles west of Kennett, shows an ore shoot 30' wide carrying low-grade copper ore with gold values. Mine shipped 2,500 tons in 1908 to the Garfield smelter. Equipment includes electric power.

GOOD HOPE GOLD & COPPER MG. & DEV. CO.

WASHINGTON

Idle. Office: Aurora, Ore. Mine near Index, Snohomish Co., Wash. H. A. Snyder, pres.; Capt. J. F. Boon, vice-pres.; F. P. Hallinan, sec.-treas.; preceding officers, H. L. Bent, Gustave Friewald and Fred R. Thompson, directors; Wm. J. Walters, gen. mgr., at last accounts. Organized under laws of Washington, capitalization \$1,000,000, shares \$1 par. Lands, 10 claims, having an opencut and 6 tunnels, with about 1,000' of workings, claimed to show 50,000 tons of ore, assaying 2% copper and 12% lead, with fair gold and silver values. Shipped some ore, 1910, to the Tacoma smelter.

GOOD HOPE MINING & REDUCTION CO.

COLORADO

Probably dead. Former address Del Norte, Colo. Mine at Vulcan, Saguasche Co., Colo.

GOODENOUGH MINES, LTD.

BRITISH COLUMBIA

Located near Sandon, B. C., east of the Noble Five group. Property under lease to Carlson & Lund. Is a silver-lead property. In May, 1913, a strike was reported to have opened up 4' of copper-stained quartz, carrying free gold.

GOODRO MINE.

ALASKA

Mine office: Kasaan, Alaska. Mine, on the Kasaan peninsula, said to have considerable development, carries auriferous copper ore. Shipments were begun Oct., 1909, and about 3,000 tons of ore shipped during 1910. Production estimated at 250,000 lbs. fine copper. Idle at last accounts.

GOONEY MANOR COPPER CO., INC.**VIRGINIA**

Office and mine: Front Royal, Warren Co., Va. Hugh E. Naylor, pres., gen. mgr. and purch. agt.; Lewis F. Cooper, vice-pres.; S. G. Waller, sec.; A. J. Sager, supt. and engr.; Geo. H. Bowman, treas.; preceding officers, H. C. Sheetz, E. H. Jackson, S. M. Chiles, S. R. Millar, G. H. Kinzell, directors; L. C. Trent, mg. engr.; F. A. Genth, chemist-assayer. Organized July 12, 1909, under laws of Virginia, capitalization \$500,000, shares \$100 par; issued 3,525. Annual meeting third Tuesday in July.

Lands, 84 acres, 5 miles south of Front Royal, reported to carry a fissure vein in porphyry and contact deposits between limestone and porphyry, with generally northeast and southwest strike and dip of about 55°. Main orebody is reported to average 7' width, and to be traceable 800', carrying a little malachite near surface, with chalcopryite at depth, averaging 3% copper, 1 to 6 oz. silver and \$1 to \$8 gold per ton. Orebodies apparently are lenticular. Development is by a 40' open cut, a 65' tunnel and by shafts of 250 and 228' without laterals, estimated by company to show 35,000 tons of ore. Equipment includes a 173-h. p. steam plant, with a 13-h. p. hoist good for 800' depth, and a 1-drill Rand air compressor. Buildings include a smithy, engine house, tool house and dwelling. Company planned developing the orebody for about 1,000' in length and installing a larger hoist and air compressor. Shaft to be driven to 350'. Ore sent to Baltimore Copper Smelting & Rolling Co., Baltimore, Md.

GOOSE LAKE COPPER CO.**MONTANA**

At Cooke, Park Co., Mont. Operating Copper King group, in 1912. Described Vol. VIII.

GOULD COPPER MINING CO.**ARIZONA**

Idle. Letters to Tucson, Ariz., unanswered. S. H. Gould, pres. and gen. mgr.; C. E. Hutchison, vice-pres.; W. H. Daily, sec.; Dr. W. V. Whitmore, treas. Capitalization \$1,000,000, shares \$1 par. Lands, 19 claims, in the Tucson mountains, 18 miles west of Tucson, the nearest rail point. Lands carry about 1 mile of the E. W. strike of a mineral zone of 2,000' width and 5 miles length. Country rocks are limestone, granite and quartzite, the mineral zone carrying a vein of about 40' width, having chalcopryite, with quartz gangue, said to average about 3% copper, 3 oz. silver and \$1.50 gold per ton. Mine has 365' shaft and 2 lesser shafts, also 2 short tunnels; claimed, 1910, to have 100,000 tons of ore in sight.

Equipment includes a gasoline hoist and air compressor, with necessary mine buildings. Plans were made for a 125-ton smelter, to be put up by Pioneer Smelting Co., which was not built here, but at Twin Buttes, 22 miles south of Tucson. Production was 45,036 lbs. fine copper in 1907. Property considered promising.

GOULD ISLAND MINE.**ALASKA**

Idle. Letter unclaimed at Sulzer, Prince of Wales Island, Alaska. H. R. Gould, owner and mgr., at last accounts. Lands, 1 claim, 20 acres, showing a lenticular orebody, between hornblende-schist and limestone, up to 40' in width, giving assays of about 6% copper, 1 to 20% lead, 3% zinc, 1 oz. silver and \$4 gold per ton, from chalcopryite, galena and sphalerite. Development by tunnels of 60 and 70'.

GOWGANDA COPPER CO.**NEVADA**

Office: 211 South Bellevue Ave., Goldfield, Nev. C. A. Braconier, pres.; Herman Krieger, sec.; S. H. Thompson, Reese Wampler, W. H. Brock, directors. Organized July, 1913, under laws of Nevada, capitalization \$100,000, shares 10 cts. par. Property, 9 claims, near Round mountain, 14 miles south of Goldfield, said to show a large deposit of low-grade

copper ore with streaks and seams high in copper. Workings are as yet shallow.

GRAFTER COPPER MINING CO.

YUKON

Idle. Mine near White Horse, Yukon, Canada. Hon. Robert Lowe, pres. and gen. mgr.; Fred Whitman, supt., at last accounts. Lands, 1 claim, crown-granted, area 50 acres, elevation 3,822', 1 mile north of the Arctic Chief. Mine has a 7-mile wagon road to the terminus of the White Pass & Yukon railway. Property lies in an area of narrow alternating bands of limestone and diorite, considerably altered, with some aplitic cross dikes, showing malachite and azurite, with native copper sparingly, associated with some magnetite, succeeded, at little depth, by bornite and chalcopyrite, estimated by the Dominion government authorities to carry 8% copper and \$3 gold per ton, in a garnet-augite-tremolite gangue. Mine, opened 1900, but idle until 1907, has a shaft of about 90' depth, with first level at 50', having 150' of workings, including some stopes nearly to the surface. Mine shipped, 1905, 450 tons of ore, of 19 to 30% copper tenor, to various British Columbia smelters, and, for several months, 1907, shipped 25 to 30 tons daily to the Tyee smelter. Equipment includes steam power, and the property employs about 20 men. Production 1,500 tons of ore, estimated to have yielded 650,000 lbs. of fine copper, in 1907.

GRAHAM COUNTY COPPER CO.

ARIZONA

Owens group of claims in Graham mountains, near Cedar Springs, Navajo Co., Ariz. W. C. Rohns, mgr., at last accounts.

GRANADENA MINING CO.

MEXICO

Closed down by revolution. Mine at Santa Barbara, Hidalgo, Chihuahua, Mex. Is a silver-lead mine, producing a small amount of copper. Fully described Vol. X.

GRANBY CONS. M., SM. & POWER CO., LTD.

BRITISH COLUMBIA

Office: 52 Broadway, New York. Mine at Phoenix, Boundary district, B. C. Smelter at Grand Forks, Boundary district, B. C. Wm. H. Nichols, pres.; Jay P. Graves, W. H. Robinson and Edwin Thorne, vice-presidents; F. M. Sylvester, gen. mgr.; Northrup Fowler, sec.; Geo. W. Wooster, treas.; preceding officers, Sanford H. Steele, Wm. A. Nash, Bernard Hochschild, Geo. Martin Luther, J. B. F. Herreshoff, Wm. Hamlin and E. R. Nichols, directors; C. O. Mailloux, asst. to pres.; O. B. Smith, Jr., supt.; Wakeley A. Williams, smelter supt.; J. C. Morgan, supt. Old Ironsides group; C. M. Campbell, asst. supt.; J. C. McDonald, master mech.

Incorporated March 29, 1901, by special act of the British Columbia parliament, capitalization \$20,000,000.; originally \$15,000,000; shares \$10 par, changed, 1906, to \$100 par; issued \$14,964,800. Bonds authorized Feb. 25, 1913, \$5,000,000, first-mortgage, 6%, 15-year, convertible at par. Series A of \$1,500,000 bonds underwritten Feb., 1912, at 96 by Speyer & Co. Bonds redeemable at 105 plus interest after 10 years, 4% to be retired by purchase at \$110, annually. Early 1910 the company sold 13,500 shares at \$85 per share; shareholders being given pro rata rights to subscribe. Shares are listed on the Boston Stock Exchange. Boston Safe Deposit & Trust Co., Boston, registrar; American Loan & Trust Co., Boston, and Title Guaranty & Trust Co., New York, transfer agents. Annual meeting, first Tuesday in October.

Company was organized to purchase the property and assets of the Old Ironsides Mining Co., the Knob Hill Gold Mining Co., Ltd., the Gray Eagle Gold Mining Co., Ltd., the Granby Consolidated Mining & Smelting Co., Ltd., and the Grand Forks Water & Light Co., at an aggregate cost of \$12,097,030. Stock to the amount of \$1,402,970 was issued for cash and services rendered.

Net profits for fiscal year ending June 30, 1912, were \$583,379, as compared with \$217,416 for 1911 and \$564,946 for 1910. Dividends have been paid as follows: \$133,630 in 1903; \$339,991 in 1905; \$1,620,000 in 1906; \$1,215,000 in 1907; \$540,000 in 1908; \$270,000 in 1909, and \$248,481 in 1910. Dividends were resumed 1913 with \$1.50 March 1, and \$1.50 June 2.

Report for year ended June 30, 1913, shows operating profit of \$1,214,599, or \$8 per share, against \$583,379, or \$3.90 per share, in previous year. Interest on bonds in 1913 brought net profit down to \$7.50 per share. Costs were reduced more than a half-cent per lb., or from 11.1 cts. to 10.6 cts.

The income account is as follows:

	1913.	1912.	1911.	1910.
Gross sales.....	\$4,782,691	\$2,874,760	\$3,216,014	\$4,099,925
Expenses	3,568,092	2,291,381	2,999,489	3,534,978
Net profits	1,214,599	583,379	216,525	564,946
Dividends	449,955	.....	148,481	270,000
Fixed charges	80,665	.....	.....	.....
Depreciation	829	600,562	.....	.....
Surplus	683,149	17,183	68,044	294,946
Total surplus	3,199,270	2,516,122	2,532,414	2,464,370

Cost per ton of ore, including all expenses, was \$2.65, against \$2.90 in 1911-12. Cost per pound of copper was 10.6 cts., against 11.1 cts., after deducting gold and silver values.

We compare balance sheet as follows:

Assets:	1913.	1912.	1911.
Land, machinery, etc.....	\$15,070,786	\$15,081,005	\$15,218,380
Hidden Creek investment.....	.....	979,461	.....
Stocks and bonds.....	513,578	519,333	1,205,891
Anyox plant investment (\$1,058,724 of above invested 1913).....	2,038,035	.....	.....
Supplies	259,035	164,191	160,018
Cash and copper.....	1,853,758	791,789	919,622
Total	19,735,344	17,535,780	17,503,910
Liabilities:			
Capital stock	14,998,515	14,998,515	14,849,535
First Mortgage 6% gold bonds.....	*1,500,000	.....	.....
Dividends held for liquidation.....	889	.....	.....
Accounts payable	37,558	21,143	121,931
Surplus	3,199,270	2,516,122	2,532,414
Total	19,735,344	17,535,780	17,503,910

*Issued May 1, 1913, due May 1, 1928.

Mining properties include original Granby group at Phoenix in the Boundary district, B. C.; the Hidden Creek mine on Granby bay, Observatory inlet, B. C.; Copper Key and Belcher groups at Belcher mountain, Wash., taken over, 1910, under a working bond and lease, and the Oversight group; also a large interest in the coal mine and coking plant at Crow Nest Pass, and a 100,000-h. p. waterpower plant at Kettle falls, both together valued at \$2,000,000.

The Granby or Knob Hill properties at Phoenix, B. C., consist of 43 claims and fractions, area 1,050 acres, 15 of the claims being in the mineralized area. This group includes the Old Ironsides, Knob Hill, Victoria, Gray Eagle, Banner, Tip Top, Triangle, Gold Drop, Curlew, Monarch, Tamarrack, Monte, No. 13, and other claims, forming a compact tract of about 8,000x9,000' size, carrying 8,000' of the strike of the mineralized zone. The Phoenix property has 2 distinct sets of orebodies. The largest and longest worked are those of the Knob Hill-Ironside mines; the other one, one-half

mile east is the Gold Drop. The first named has 3 mines with separate crews and equipment.

The geology of the district is not simple. Paleozoic rocks, limestones, tuffs and argillites overlie beds of fragmental volcanic rocks with small amounts of limestone. These rocks are intensely altered by contact metamorphism, due to igneous intrusions, and orebodies formed in basin-shaped troughs in the zone of mineralization. They are replacements of limestone by garnet, epidote, quartz-calcite, with magnetite and finely-divided copper pyrite. The footwall is either jasperoid or limestone; the hanging wall is determined by assays.

The Old Ironsides-Knob Hill claims carry the main orebody, the Gold Drop ore deposit being irregular in shape, and of limited size. The main orebody has an approximately north-south strike, with an eastward dip of 60° at surface and 30° at depth. The main orebody is estimated by the company as 900' in average width, a maximum thickness of 125' and 2,600' in length; the ore, carrying chalcopyrite, originally averaged about 1.7% copper, 0.5 oz. silver, and \$2 gold per ton, with 14 to 17% iron, 35 to 40% silica, 18 to 20% calcium carbonate, 3 to 4% sulphur, and about 7% alumina and 7% magnesia, constituting an almost ideal self-fluxing ore. The ore mined in 1912 yielded 1.25% copper, 0.29 oz. silver, and 0.043 oz. gold per ton in metals recovered. The mine is opened by an immense pit, or glory-hole, 400x1,000' in size, which, however, is worked out and present extraction is mainly through tunnels.

There are 5 shafts, the more important being the 300' Aetna shaft, 400' No. 2 shaft, and the 485' Victoria shaft. The former No. 1 shaft was broken into the open pit. Principal extraction is by tunnels, including the 250' Knob Hill tunnel; 250' No. 1 Gold Drop tunnel; 1,000' No. 3 Gold Drop tunnel; 2,500' No. 2 tunnel; 3,000' No. 3 tunnel, and 1,500' No. 4 tunnel. The mine has a total of 47,400' workings. The ore stoped on the various tunnel levels is milled through chutes to lower levels, the mine having electric haulage on the 200', 300' and 400' levels, with double-tracked tunnels, equipped with 75-h. p. locomotives drawing 10-ton ore cars. Company mined 1,250,689 tons in 1912; 606,000 in 1911, and 1,075,000 tons in 1910. Development work for 1912 was 11,000' of underground work and 6,311' diamond drilling, or about 1,000' per month, adding 14 cts. per ton to cost of ore mined. Total shipments up to June 30, 1913, have been: above No. 1 tunnel, 4,731,637 tons; Victoria shaft, 2,362,303 tons, and Gold Drop mine, 881,254 tons.

The 485' three-compartment Victoria shaft has a daily productive capacity of about 3,000 tons from levels at 200', 300' and 400' in depth. Mining costs per ton including development and diamond-drill work is 77.1 cts., and ore recovered 90% of ore blocked out. The mechanical equipment at the mine is fully described, Volume X.

The 3 main haulage tunnels are each equipped at the portal with 150-ton crushers, and bins of 2,000 and 3,000 tons capacity. The main crusher house, at the portal of No. 3 tunnel, has a 30x42" Farrell-Bacon crusher, driven by a 150-h. p. Westinghouse motor, the crusher being capable of breaking masses of nearly a cubic yard in size to chunks not larger than 7 to 8". A 42" rubber belt conveyor, with capacity of 250 tons hourly, handles the ore.

The mine is connected with the smelter, 24 miles distant, by 2 railways, the Canadian Pacific and the Great Northern. By means of extensive ore bins at the Victoria shaft and the 3 main tunnels, a train of 35 thirty-ton cars can be loaded in 25 minutes or less. The company's reduction plant at Grand Forks has up-to-date smelting, converting and power plants, with 2,000 acres of land and 68 town lots. Smelter has 4,400 tons daily

capacity, being much the largest in Canada, and among the largest in the world. Steel storage bins hold 8,000 tons of coke and 13,000 tons of ore. Ore is handled by 4 electric locomotives, each drawing two 2-ton cars, constituting a single charge; the ore being practically self-fluxing, is charged without concentration, or assortment, just as it comes from the mines, with the addition of limestone and fuel.

The 8 blast furnaces are 4x22' in cross-section at the tuyeres. There is a 10x11x800' brick dust flue. A steel dust chamber, set 22' above the charging floor, on foundations of steel columns, masonry and concrete, is 13' wide, 15' high and 313' long, with a floor of 28 hoppers, having a conveyor underneath for flue dust. In 1912, all 8 furnaces were run for 157 consecutive days without interruption, smelting 1,200,000 tons in the year's operation. Slags now granulated are dewatered, carried on conveying belts to a height of 120' and discharged.

The first-fusion 40% matte is taken in ladles by a 40-ton electric traveling crane to the converter house, which has 3 stands, electrically-operated by 25-h. p. motors, with ten 84x126" shells of barrel type. There are 3 mould carriers under each stand and the product is blister copper of 98.5% tenor, containing an average of 18 oz. silver and 4 oz. gold per ton. sent to the Laurel Hill works of the Nichols Copper Co., for electrolytic refining.

The smelter power plant is driven by electricity. Equipment includes 9 small blowers and 2 Connorsville Jumbo blowers, with capacity of 100,000 cu. ft. of free air per minute, driven by two 300-h. p. motors. Converter blast is furnished by an Allis-Chalmers double-cylinder air compressor, with capacity to reduce 10,000 cu. ft. of free air per minute to a pressure of 15 lbs. per square inch, driven by a 500-h. p. direct-connected electric motor.

The Hidden Bay property on the Pacific coast is now owned by the Granby Co. It is located on Granby (formerly Goose) bay, on Observatory inlet, south of and parallel to Portland canal. It is probably the largest copper mine of British Columbia, being reported to have 6,000,000 tons of 2% ore, or 12,000,000 of 1.65% copper ore. The 9 claims cover the top and sides of a hill 920' high, that is enclosed by 2 branches of Hidden creek and is 2 miles from Anyox, the smelter site and seaport town of the company.

The ore occurs as a mass of solid sulphides, pyrite and chalcopyrite, or mixed with country rock in shear zones, in crushed and schistose argillite. The rocks are folded and mashed but are part of the cover of the great granite mass forming the Coast range. There are 2 deposits, one 25 to 40' wide, traced 1,400', said to average 6%, the other estimated to be 100' wide and of unknown length. Development by diamond drill holes shows the ore to extend 300' below sea-level, a vertical distance of 1,250' below outcrop.

Development is by 4 tunnels, each known by its height, 353', 530', 630', 700' above sea-level. Development, 1912, was 8,671' of underground work, 1,051' of raise and 53,590' of diamond drilling. Crosscuts and drifts from the tunnels, combined with diamond drill work from the faces, has blocked out the ore.

In July, 1913, 1,125 men were employed, the smelter and converter plant were under construction, and the entire plant should be in operation Jan., 1914. Expenditures on property up to Jan., 1913, amounted to \$1,324,554, and a further expense of \$1,620,000 will be incurred in 1913, according to the company's estimates. As the company had but \$1,095,595 cash on hand, it issued \$1,500,000 worth of bonds to take care of this expense. The company has already let a contract for \$700,000 worth of machinery to be used in the 2,000-ton smelter, costing \$1,500,000 at the sea shore. Company has

also laid out a town, installed water works, electric plant, graded streets, built docks, 100 dwellings, stores, hospitals, etc.

Company also has an option on the Bonanza group, adjacent to the Hidden Creek mine and is reported to have acquired the Moulton-Hartley claim, near Portland canal, which yields fluxing ore.

The Grand Forks smelter requires pyritic ores and an examination has been made of all available claims for 100 miles around, but thus far without results. In May, 1913, the company bonded the Copper Key claims at Belcher mountain, Wash., in which a large tonnage is reported, the Washington, Dutch Jake, and other iron claims between Belcher mountain and Curlew lake, also known as the Lame Foot group, and the Oversight group. These properties will all be prospected by diamond drill.

For fiscal year ending June 30, the largest net earnings were \$1,924,937, in 1907, and net profits for year 1912 were \$583,379, the company ending that year with net cash assets of \$1,454,170. Cost of ore treated, exclusive of marketing blister copper, was \$4.77 per ton for 1901, and \$2.90 in 1912, compared with \$2.50 per ton for 1910, this latter being the lowest figure yet reached.

Cost of finished copper, delivered, after deducting gold and silver values, was 8.35 cts. per lb. in 1906; 10.14 cts. in 1907; 10.24 cts. in 1908; 10 cts. in 1909; 10.34 cts. in 1910. Gross ore production to June 30, 1912, was 7,944,373 tons, of which 721,719 tons was mined and smelted in the fiscal year 1912. Recovery was 31.49 lbs. fine copper, 0.4406 oz. silver, and 0.1003 oz. gold, per ton in the fiscal year 1901, declining to 18.39 lbs. copper, 0.29 oz. silver, and 0.02 oz. gold in 1912, the falling off in all 3 metals having been most marked in the 3 last years. Recent production has been as follows: 16,410,576 lbs. fine copper, 201,337 oz. silver, and 32,738 oz. gold in 1907; 21,092,288 lbs. copper, 300,204 oz. silver and 40,068 oz. gold in 1908; 21,901,528 lbs. copper, 335,520 oz. silver and 45,760 oz. gold in 1909; 22,754,899 lbs. copper, 356,746 oz. silver and 48,752 oz. gold in 1910; 17,855,130 lbs. copper, 354,504 oz. silver and 41,744 oz. gold in 1911; 13,231,121 lbs. copper, 225,305 oz. silver and 33,932 oz. gold in 1912. Production for year ending June 30, 1913, was 324,336 oz. silver, 47,266 oz. gold and 22,641,750 lbs. copper, latter at a cost of 10.6 cts. per lb. after deducting gold-silver values.

Granby has been a disappointment to its stockholders in the past, especially in the matter of ore reserves, but the decision to bond the mines and smelter to finance the Hidden Creek property and to resume payment of dividends has restored good humor generally. The Phoenix property has as much ore in sight as the total amount thus far mined and the Hidden Bay has developed into a better mine than that at Phoenix. Granby is un-under efficient, progressive management and a prosperous future seems assured.

GRAND CENTRAL MINING CO. ARIZONA

Office: 43 Exchange Place, New York. Mine office: Tucson, Pima Co., Ariz. Geo. H. Daily, pres.; R. W. Langworthy, sec.; Frederick Kopper, Jr., treas., at last accounts. Organized 1905, under laws of Arizona, capitalization \$1,000,000; shares \$5 par, nonassessable.

Lands; 10 claims, unpatented, area 200 acres, adjoining the old Yuma mine. 14 miles northwest of Tucson, in the Amole district of the Tucson mountains. Property shows granite porphyry, quartzite and limestone, carrying 4 orebodies, 2 developed by 10 pits and shafts of 10 to 75' depth, and by 6 tunnels of 15 to 40'. Management estimates the main vein to average 40' in width, and to carry 1% copper, 7% lead, 5 oz. silver and \$6.30 gold per ton. Ore includes bunches of copper and lead carbonates, and argentiferous

galena. Management plans deepening shafts to the water level, and adding gasoline power. No recent returns secured.

GRAND CENTRAL MINING CO.

UTAH

Office: Provo, Utah. Mine office: Robinson, Juab Co., Utah. Jos. T. Farrar, pres.; Lafayette Holbrook, vice-pres.; Preston J. Peterson, sec.-treas.; Col. Edwin C. Loose, mgr.; W. D. Loose, asst. mgr. Organized Feb., 1902, under laws of Colorado, capitalization \$600,000, increased 1909 from \$250,000, shares \$1 par, nonassessable; issued 500,000. Last dividend 5 cts., giving total dividends to Jan. 1, 1913, of \$1,477,750. Annual statement for year ending Dec. 31, 1911, showed cash received from ore sales, \$186,-302; dividends paid, \$25,000; cash on hand, \$9,408.

The Grand Central is the deepest mine of the Tintic district. It adjoins the Centennial Eureka and is opened to the 2,400' level, carrying a vein with an orebody that is 200' wide in places and of low average grade, though it is the largest orebody in the Tintic camp. A second ore shoot, 700' west of the old one, and with parallel strike, was opened, 1910, on the 2,000' and 2,100' levels. This ore shoot averages 15 to 20% copper on the 2,380' level and has been opened up on the 1,600' level for a distance of 1,200' showing a width of 50 to 100'. At this point the ore is bunchy, requiring careful sorting. Mine producing, 1913, from the 700' to the 2,400' levels, inclusive. Production for 1911 was 26,217 tons of ore averaging 4% copper, 10% lead, 30 oz. silver and \$3 gold per ton, yielding a gross value of \$341,010, of which \$35,417 was derived from the copper. Management plans sinking main shaft 200' and electrifying the property, having passed the September dividend in order to accumulate a surplus for this purpose. Property and management good.

GRAND DOMINION COPPER CO.

UTAH

Idle. Letter unclaimed at Salt Lake City, Utah, and at former mine office, Milford, Beaver Co., Utah. David C. Rees, pres. and gen. mgr.; Thos. F. Thomas, vice-pres.; John James, sec.-treas.; preceding officers, Jos. Melich, W. H. Roberts and Geo. R. Ayre, directors. Organized Nov. 22, 1907, under laws of Utah, capitalization \$600,000, shares \$1 par, nonassessable. Shares are listed on the Duluth Stock Exchange. Lands, 7 claims, unpatented, 140 acres, adjoining St. Mary's on the southeast, and lying near the Red Warrior and Moscow mines, in the Star district, 4 miles from a railway. The mine has a shallow shaft and a 300' tunnel, said to have a 250' back, developing an 18' vein carrying 26% copper, 10 oz. silver and \$1 gold per ton.

GRAND EASTERN MINING CO.

UTAH

Probably dead. Letter unclaimed at Eureka, Juab Co., Utah. E. R. Higginson, pres. and mgr.; C. E. Berry, sec.-treas.; preceding officers, A. F. Baxter, W. E. Saintsbury and John A. Allen, directors. Organized, 1909, under laws of Utah, capitalization \$100,000, shares 10 cts. par. Lands are 11 claims.

GRAND GULCH MINING CO.

ARIZONA

Office: 503 McIntyre Bldg., Salt Lake City, Utah. Mine office: St. Thomas, Clark Co., Nev. Wm. H. McIntyre, pres.; Frank R. Snow, vice-pres.; W. P. Jennings, sec.-treas. and gen. mgr.; preceding officers, Jas. E. Jennings, Wm. C. Jennings, Jos. A. Jennings and Heber M. Wells, directors; S. R. Calloway, supt. Organized Sept. 15, 1874, under laws of Utah, capitalization \$750,000, shares \$2.50 par; issued, \$600,000. Total assessments to end of 1910 were \$14,400, with dividends of \$4,800. Annual meeting, first Monday in February.

Lands, 9 claims, 1 patented, area 180 acres, in the Bentley district of Mohave county, Ariz., but more easily accessible from Nevada than from

southern or central Arizona, owing to the barrier to access presented by the Grand cañon of the Colorado river. Property shows sandstone and limestone carrying an apparently circular zone of copper impregnations, also having copper in the bedding planes, ores occurring as cuprite, melaconite, malachite, azurite and chalcocite, all argentiferous, estimated by management to assay 35% copper and 4 oz. silver per ton. Development is by a 500' shaft. Mine is 45 miles from St. Thomas, Nev., railroad terminal on the San Pedro railroad. The mine has been in practically continuous operation since 1899.

Equipment includes a 22-h. p. gasoline hoist, good for 800' depth, and a 2-drill air compressor. There are 9 buildings, including a boarding house, bunk house and necessary shops, and a small and antiquated smelter, of no present value. Production, to end of 1909, was 299,154 lbs. fine copper, and 1,190 tons in 1912, said to carry 12 to 27% copper and 1 to 2.7 oz. silver. Property considered promising.

GRAND GULCH MINING CO.

NEVADA

W. P. Jennings, mgr., McIntyre Bldg., Salt Lake City, Utah. S. R. Calloway, supt., St. Thomas, Lincoln Co., Nev. Property, the Adams group, with replacement deposits of copper ore developed by shaft. Equipment includes Fairbanks air compressor, gasoline hoist, etc.

GRAND PRIZE GROUP.

NEVADA

Property at Hamilton, White Pine Co., Nev. A strike was reported March, 1913. Ore said to average 250 oz. silver, 40 to 60% lead and 8 to 12% copper.

GRAND REEF MINE.

ARIZONA

R. V. Dey, owner, 208 Flood Bldg., San Francisco, Cal. James Quinn, supt. Property, 14 claims, patented, in the Aravaipa district, Graham Co., Ariz. Ores occur in fissure veins between granite and porphyry with average values of 3½% copper, 24% lead, 12 oz. silver and \$2.30 gold per ton. Developed by 7,500' of workings in which superintendent estimates 175,000 tons of ore blocked out. Equipped with steam hoist and 7-drill air compressor. Ore is shipped to El Paso smelter.

GRAND TRAVERSE & ARIZONA MINING CO.

ARIZONA

Idle since 1910. Office: 129 East Front St., Traverse City, Mich. Mine near Cave Creek, Maricopa Co., Ariz. Thos. Smurthwaite, pres.; Geo. R. Ray, vice-pres.; O. P. Carver, sec.-treas.; Walter E. Greilick and H. Montague, directors; Walter Horner, gen. mgr.; A. Scharingron, mine supt., at last accounts. Organized May 6, 1903, under laws of Arizona, capitalization \$2,000,000, shares \$1 par; issued, \$1,770,000. Annual meeting, second Tuesday in January. Owns 3 patented claims. Fully described Vol. X.

GRANITE CONTACT MINES CO.

CALIFORNIA

Probably closed down. Mine at Skidoo, Inyo Co., Cal. J. W. Seller, pres.; Clay Tallman, vice-pres.; J. J. Fagan, sec.; G. B. Keenan, treas., at last accounts. Organized under laws of Arizona, capitalization \$1,250,000, shares \$1 par, nonassessable. Lands, 8 claims, unpatented, showing copper ore, on which very little work has been done.

GRANITE COPPER CO.

UTAH

Office and mine: Beaver, Beaver Co., Utah. A. L. Fotheringham, pres. and mgr.; Jos. McEwen, vice-pres.; J. F. Tolton, sec.-treas., at last accounts. Capitalization \$1,000,000, shares \$1 par. Mine, in the Mineral range between Milford and Beaver, Utah, has a 2' vein, carrying high-grade silver-lead ore with some copper, opened by a 250' shaft and tunnel. Was developing, 1912.

GRANITE HILL COPPER MINE.

NEVADA

Warner-Nelson Co., owners. Property, 14 miles northwest of Reno,

Nev., reported to have shipped 51 tons of ore averaging 15% copper and \$15 in gold and silver per ton, 1913.

GRANITE MINING & MILLING CO.

UTAH

C. A. Lundstrom, superintendent, Santaquin, Utah Co., Utah. Property, the Granite mine, showing limestone with ore-bearing fissures, carrying replacement deposits of copper and silver-lead ore developed by 1,000' tunnel. Employs about 15 men.

GRANITE TUNNEL CO.

COLORADO

Jacob C. Kirsch, superintendent, Granite, Chaffee Co., Colo. Property, the Yankee Blade mine, shows lead-copper ores, developed by tunnel. Operated intermittently.

GRANT CONSOLIDATED COPPER MINING CO. WASHINGTON

Probably closed down. Office: Spokane, Wash. Mine office: Chesaw, Okanogan Co., Wash. Geo. A. McLeod, mgr.; A. D. McPhee, supt., at last accounts. Organized 1907, under laws of Washington, capitalization \$1,650,000. Lands, 14 claims, on Copper mountain, near Chesaw, developed by an open cut and a tunnel planned to be driven 1,500', cutting 2 strong veins carrying medium-grade chalcopryrite in considerable quantities. Shipments, 1907, 200 tons, to the Granby smelter, returned about 6% copper and \$3 gold per ton. Equipment includes two 80-h. p. boilers and an air compressor.

GRANT MINE.

NEW YORK

Mine near Carmel, Putnam Co., N. Y. The orebody consists of a complex of arsenical sulphides, carrying copper, quicksilver, gold and iron. The crude ore is estimated to have a gross value of about \$25 per ton, but, on account of its refractory nature, has no present commercial value, and cannot be utilized without special metallurgical treatment. Closed down for several years.

GRATIOT MINING CO.

MICHIGAN

Office: 12 Ashburton Place, Boston, Mass. Operating office: Calumet, Mich. Quincy A. Shaw, pres.; Rodolphe L. Agassiz, vice-pres.; Geo. A. Flagg, sec.-treas.; Jas. MacNaughton, gen. mgr., and Francis L. Higginson, directors. Organized Feb. 16, 1906, under laws of Maine, capitalization \$300,000, shares \$3 par, fully paid. Is controlled, through ownership of 50,100 shares, by the Calumet & Hecla Mining Co. Ended year Dec. 31, 1912, with debit balance of \$358,510.57.

Lands, 600 acres, being the N. W. $\frac{1}{4}$ of Sec. 26, N. E. $\frac{1}{4}$ of Sec. 27, S. E. $\frac{1}{4}$ of Sec. 23, and S. E. $\frac{1}{4}$ of Sec. 22, except the N. W. $\frac{1}{4}$ of the N. W. $\frac{1}{4}$, T. 57 N., R. 32 W. Property lies south and east of the Seneca and north and east of the Mohawk, carrying the Kearsarge amygdaloidal bed under about 175 acres, to a maximum depth of about 2,700'. Extensive drill borings were made before the shafts were started. The Kearsarge bed averages about 12' in width, with strike of north 42° east, and average dip of 33 to 36° with the horizon, and its copper contents are painfully low.

Development is by two 3-compartment shafts, exact duplicates, 9x22' inside of timbers, with ladderways in the middle, sunk at an angle of 36° on the Kearsarge bed, two shafts being sufficient to develop the entire tract. Levels are opened at 100' intervals.

No. 1 shaft, about 1,500' from the Seneca boundary, is 1,900' deep, having a bed up to 18' in maximum width. Drifting has been done on the alternate odd-numbered levels, from the 1st to 9th, inclusive.

No. 2 shaft, 1,475' southwest of No. 1, and 1,800' north of Mohawk No. 1, is 1,520' deep, and drifting has been done on the 2nd, 3rd, 5th, and 7th levels; the best showing being on the 5th.

Each shaft has a single compartment shaft rock house, which can be

enlarged later. Property is served by a 2¼-mile spur of the Mineral Range railway, built north from the Mohawk mine.

Production was begun July, 1910, at the rate of 300 tons daily, mainly taken from stock piles, and was decreased later to about 50 tons daily, from the mine, rock going to the Centennial mill. Production, 1910, was 28,552 tons of rock, yielding 265,869 lbs. fine copper, and in 1911, was 1,347 tons rock, yielding 14,275 lbs. fine copper, or about 9.3 lbs. copper per ton of rock milled. The mine was shut down April 3, 1911. It is obvious that, owing to its comparatively small size and shallow depth, the Gratiot cannot work the Kearsarge bed profitably at the average price of copper, except on a very large scale, and it could be operated much more advantageously in connection with the Seneca than alone.

GRAY COPPER MINING CO., LTD.

IDAHO

Mine office: Osburn, Shoshone Co., Idaho. E. F. Hall, pres.; W. H. Herrick, sec. and mgr. Capitalization \$375,000, shares 25 cts. par. Lands, 7 claims, 2 very hard miles from a railroad, on McFarren gulch, 12 miles from Osburn, showing a vein of 6 to 20' surface width, developed by a combination crosscut and drift tunnel, showing mainly argentiferous and auriferous gray copper ore, said to average 17% copper, 20 oz. silver and \$10 gold per ton. A little high-grade ore was shipped, 1908, to the Tacoma smelter.

The reported amalgamation with the Lead King Mining Co. did not go through and the company is dormant at the present time.

GRAY COPPER MINING CO.

WASHINGTON

Oscar de Camp, supt., at last accounts. Property, between Newport and Ione, Stevens Co., Wash. A 4' vein carrying copper and silver was exposed by open-cut work and shown in a 235' tunnel which has a 15' drift on the vein. Development in progress at last accounts.

GRAY EAGLE MINE.

CALIFORNIA

Office: Care of John B. Farish, 25 Broad St., New York. Fred H. Dakin, supt. Mine at Happy Camp, Siskiyou Co., Cal. Property in private ownership, consists of 14 claims, 250 acres, patented, known as Dakin mine in Happy Camp district, Cal.

Ore bodies are replacements in schist, similar to those of the great mines of Shasta county. They are from 10 to 70' wide, traceable throughout the property, running north 60° west and developed to a depth of 600' on a 30° dip. The ores carry 3 to 6% copper, present as chalcopyrite associated with pyrite.

Developed by adit tunnels from 200 to 800' long. About 1 mile of underground workings developed ore bodies, whose limits have not been reached.

GRAY ROCK MINING CO.

UTAH

Idle. Letter unclaimed at Eureka and Robinson, Juab Co., Utah. C. C. Griggs, pres.; C. E. Huish, vice-pres.; R. A. Badger, sec.-treas. Organized April, 1909, under laws of Utah, capitalization \$50,000, shares 5 cts. par, assessable. Lands, 12 claims, unpatented, in the East Tintic district, 2 miles from a railroad, slightly developed by a shaft, showing copper and lead ores.

GREAT BONANZA GOLD MINING CO., LTD.

COLORADO

Probably dead. Letters unanswered from London, E. C., Eng., and Central City, Gilpin Co., Colo. W. B. Bishop, chairman; G. B. Ewing and Col. C. R. Rowley, directors; J. McKechnie, sec.; Cecil C. Morgan, mine mgr. Organized April 3, 1891, under the laws of Great Britain, capitalization £100,000, shares £1 par; issued, £50,000, fully paid. Debentures, £3,200, at 8%. Property is the Next President and Bledsoe mines, on

Gregory hill, Gilpin Co., Colo., carrying auriferous and argentiferous copper ore, developed by shafts. Equipment includes steam power and a 35-stamp mill, bought, 1909, for £3,200.

GREAT BRAS D'OR GOLD MINING CO.

NOVA SCOTIA

Idle. Address: 616 Old South Bldg., Boston, Mass. Mine near Goldbrook, Cape Breton Co., N. S. Theodor Kuntzen, mgr., at last accounts. Mine carries auriferous copper ore, with values mainly in gold. Equipment includes a steam plant and an air compressor, with a 10-stamp mill and 40-ton concentrator. No recent returns secured.

GREAT BRITAIN GROUP.

ALASKA

Owned by a Vancouver and Victoria syndicate. R. O. Clark, of Victoria, B. C., pres.; F. J. Crossland, cons. engr. and mgr. Property at Whalebone cove, on the western shore of South Valdez island, Alaska, comprises 4 claims. Ore is bornite, tetrahedrite and chalcocite, occurring in the contact between limestone and altered lime. Developed by 3 tunnels, showing 4 to 12% copper ore. Ore blocked out estimated at 1,800 tons by F. J. Crossland. Shipments of 700 to 800 tons have been made to the Tacoma smelter, said to average 3% copper. A 500-ton bunker is being erected on the beach for loading shipments on vessels.

GREAT COPPER KING MINING CO.

UTAH

Idle. Letters unclaimed at Salt Lake City, Utah, and Draper, Salt Lake Co., Utah. M. O. Froisland, pres.; Martin Christopherson, vice-pres.; Michael Froisland, sec.; Gus Bachman, treas., at last accounts. Organized Aug., 1904, under laws of Utah, capitalization \$50,000, shares 10 cts. par; issued, \$47,500. Lands, 10 claims, unpatented, including 4 claims, 1 fractional, held under bond and lease, near the mouth of Little Cottonwood canyon, 7 miles from Alta. Mine has shallow shafts and a 330' tunnel, with about 800' of workings, showing auriferous and argentiferous copper and lead ores.

GREAT DIVIDE MINES CO.

UTAH

Office: 422 McCornick Bldg., Salt Lake City, Utah. Mine office: Lincoln, Tooele Co., Utah. Henry A. McCornick, pres.; Walter A. Cooke, vice-pres. and gen. mgr.; Jos. H. Hurd, sec.; Rodney T. Badger, treas.; John B. Taylor, supt., at last accounts. Organized Aug. 15, 1903, under laws of Utah, capitalization \$2,000,000, shares \$5 par, non-assessable.

Lands, 110 claims, mainly patented, area 2,000 acres, partly timbered, with 200 acres in mill and smelter sites, lying on the Tooele side of the Oquirrh mountains, shortly west of the holdings of the Utah Consolidated, 9 miles from a railway. Property shows Cambrian quartzite, monzonite-porphry and altered limestone, with a number of fissure veins and contact deposits between limestone and quartzite. Work is being done on 6 ore-bodies, 1 to 75' width, carrying auriferous and argentiferous lead, copper and zinc sulphides, giving assays of 8.1% copper, 19.5% lead, 14 oz. silver and \$7 gold per ton. Development is by the 44' Taylor No. 2 shaft, and 110' Annie shaft, with numerous pits and tunnels, principal tunnels being the Controversy, of 228'; South, of 250'; North, of 450'; Spring No. 1, of 710' and Spring, which is the main tunnel, of 2,457'. Development began, 1899, and has been continued steadily with a small force.

Equipment includes a 35-h. p. electric plant, with a 1-drill Ingersoll air compressor, and there are 10 buildings, including a small power house, 2 smithies, a bunk house, stable and dwellings. Electric current is taken from the Telluride Power Co., over this company's private line from the sub-station at Bingham. Property considered promising. No recent returns secured.

GREAT EASTERN GROUP.**NEW MEXICO**

Address: Santa Rita, Grant Co., N. M. Al. Owen, owner. Property, 8 claims, 160 acres, adjoining Chino Copper Co.'s lands on the east side of the Santa Rita basin. The southwestern side of the group shows a quartzite capping and iron gossan, with limestone covering porphyry over other parts of the claim. Veins with a northeast course outcrop and show small percentages of copper. Property developed by 70 and 60' shafts and 134' drill hole. Owner now preparing to drill property in 200' blocks.

GREAT NORTHERN COPPER CO.**MINNESOTA**

Idle since 1911 and now being reorganized. Expects to resume operations in 1914. Office: 504 Globe Bldg., Minneapolis, Minn. Mine at Hinckley, Pine Co., Minn. C. E. Ovenshine, pres.; Dr. C. D. Snow, vice-pres.; F. M. Hutchinson, sec.; A. H. Cunningham, treas. and gen. mgr.; preceding officers, L. Paille, Wm. Elliott, E. H. Holbert, Stephen O'Dea and Godfrey Dawe, directors; F. B. Crane, supt. Organized Sept. 16, 1907, under laws of Arizona, capitalization \$1,000,000, shares \$1 par, nonassessable; issued, \$670,000.

Lands, 160 acres, freehold, 4 miles east of Hinckley, at the extreme western end of Lake Superior Keweenawan copper formation, showing bedded traps, reported to carry 31 amygdaloidal beds, of which 4, slightly developed, show native copper, with occasional malachite from weathering. Two beds, under development, of about 8' average width, traceable 1,500', are opened by a 110' tunnel, and 4 shallow shafts, developing cupriferous amygdaloids reported to average 3% copper and 6 oz. silver per ton, which seems too high.

GREAT NORTHERN COPPER CO.**MONTANA**

Owens the Great Northern mine, 1 mile north of Tava, Flathead Co., Mont. W. L. Loyde, supt., in 1912. Developed by several tunnels, 200 to 500' long, on the strike of the vein. Ore principally gold and copper.

GREAT NORTHERN COPPER CO.**NEWFOUNDLAND**

Idle. Office: Commonwealth Bldg., Pittsburgh, Pa. Mine office: Twillingate, Newfoundland. Obadiah Hodder, pres. and gen. mgr.; W. S. Tannehill, vice-pres.; Roselle C. Burns, sec.; Geo. B. Klein, treas.; preceding officers, Jeremiah Doody, Titus Hodder, Robt. M. Fwing and Chas. Hardenberg, directors. Wm. Brown Sterrett, chemist. Organized 1905, capitalization \$100,000, shares \$1 par. Company was combined with Notre Dame Copper Co. and Hodder Supply Co. of Pittsburgh, in 1912.

Lands, 320 acres, freehold, on Twillingate, North Island, on the eastern coast of Newfoundland, in the vicinity of the Tilt Cove mine. Company claims a vein 163' wide, uncovered for one-half mile and tested to depth of 200', carrying chalcopryite assaying 2 to 27.4% copper, and company claimed, early in 1909, that ore then being mined averaged 12% copper, which claim is too high for credence. Ores of this district, as developed elsewhere, average about 4% copper, 50% sulphur and \$1.50 gold per ton, and are somewhat bunchy, with sphalerite frequently found in connection with the chalcopryite. Company reported, Oct., 1910, that it had cut a 7' vein of practically solid ore. Mine is worked opencast.

Equipment includes steam power and a hoist, with a tram line and 2,000-ton ore bins on the sea.

GREAT NORTHERN DEVELOPMENT CO.**ALASKA**

Office: 2 Rector St., New York. Operating office: Valdez, Alaska. Mine and works office: Phillips, Alaska. Jas. Phillips, Jr., pres.; E. F. Gray, vice-pres.; Walter M. Briggs, sec.-treas.; Edwin F. Gray, gen. mgr.; preceding officers, J. C. Fairchild, H. F. J. Knoblauch and H. I. Gaskill, directors. Organized 1906, under laws of Maine, capitalization \$1,000,000,

shares-\$10 par, nonassessable; issued, 70,100. Is a holding company. Annual meeting, first Tuesday in November. Petley Morse & Co., auditors, 43 Exchange Place, New York.

Lands are a solid tract of about 130 claims, about 2,600 acres, immediately south of the camp, which is on the south bank of the Kotsina river, below the mouth of Roaring creek, near the Copper River railroad, and about 60 miles from the Bonanza mine of the Kennecott Co. Lands apparently lie in the greenstone formation. Development is by 600' adit with 20 crosscuts. Ore said to average 12 to 17% copper with some gold. Buildings include a saw mill driven by a Pelton wheel, under a 400' head, taking water from Roaring creek. Company has a 50-mile telephone line to Tonsina, the nearest rail station. Company did 5,000' of new underground development work in 1912.

GREAT OHIO COPPER MINE.

BRITISH COLUMBIA

Sargent & Munro, owners, New Hazelton, B. C. Property adjoins the Butte Rocher de Boule mine and carries veins with rich gold-copper ores similar to those of that mine.

GREAT STANDARD COPPER MINING CO.

WYOMING

Probably dead. Mine at Granite Canyon, Laramie Co., Wyo. Dr. Walter H. Parker, pres.; John Laughrey, vice-pres. and gen. mgr.; Chas. B. Lamont, sec. Organized Sept. 30, 1902, under laws of Arizona, capitalization \$1,000,000, shares 50 cts. par. Lands, 17 claims, with miscellaneous lands giving total holdings of 640 acres, in the Silver Crown district, said to show 6 veins, of about 8' average width, opened by 18 shallow shafts and pits, averaging 7% copper.

GREAT WESTERN COPPER CO.

ARIZONA

Mine office: Courtland, Cochise Co., Ariz. Wm. J. Young, Jr., pres.; Edw. A. Young, sec.; C. H. Young, treas., all of Clinton, Iowa; P. B. Warnekross, directors; W. G. McBride, gen. supt.; G. V. Colchester, engr. Organized Oct. 22, 1900, under laws of Arizona, capitalization \$1,000,000, shares \$10 par, nonassessable; fully issued.

Property consists of several copper mines in the Courtland district acquired about 14 years ago, and the Mammoth-Collins mine near Mammoth, Pinal county, taken under bond in 1913. The Courtland property embraces 27 claims, patented, 460 acres in the Turquoise, or Courtland district, showing limestones intruded and altered by monzonite and quartz monzonite porphyry. The Humboldt mine first opened, yielded high-grade ore from the surface to a depth of 200', where it played out. In 1908, workings on the Mary claim developed a payable orebody and the Mame mine opened up shipping ore in 1909. At the present time there are 3 orebodies which show rusty capping over a leached zone, followed by oxidized ores, succeeded by secondary sulphides, the 2 forms grading irregularly into each other. The mines are opened by vertical shafts, the Mary of 310', Mame of 300', Monarch of 430' and Humboldt 200'.

Equipment includes a 300-h. p. electric plant driven by steam power and having two 150-kw. generators, a 500' 8-drill air compressor, 2 electric hoists, electric pump, etc.

Production begun Aug., 1908, has continued intermittently ever since, and in 1913 the company was shipping an average of 90 tons a day, one-half of which came from the Mame mine. In 1910, the ores yielded 2,250,000 lbs. fine copper and in 1912 the production was nearly 4,000,000 lbs. copper from ores that averaged nearly 5%.

It is generally understood that the Courtland properties have proven disappointing, the limits of the orebodies being known and the exploration work unsuccessful. The company has, however, recently acquired

the Mammoth mine at Schultz, near Mammoth, a well-known gold mine. Claims show strong quartz veins cutting porphyritic granite and schist and carrying pyritic gold ores with abundant wulfenite. On the 700', the bottom level, the vein becomes copper-bearing and shows a shoot 2½' wide of 4 to 6% copper ore with \$9 gold per ton. The company has installed new machinery at the mine and will, it is said, deepen the shaft to 1,000' and open up the vein on several levels.

GREAT WESTERN GOLD & COPPER CO.

UTAH

Idle. Office: Provo, Utah. Jesse Knight, pres.; W. Lester Mangum, sec. Lands, at the head of Big Cottonwood cañon, adjoining the Daly Judge, show an orebody of about 100' width, giving assays of 3 to 5% copper.

GREAT WESTERN GOLD & SILVER CO.

ARIZONA

Idle. Mine office: Dragoon, Cochise Co., Ariz. Organized about June, 1908. Lands, in the Dragoon mountains, show auriferous and argentiferous lead and copper ores.

GREAT WESTERN MINE.

COLORADO

Armstrong and Vanetta, lessees, Lake George, Park Co., Colo. Property shows vein with gold-copper ore, developed by shaft and equipped with steam power and air compressor.

GREAT WESTERN MINING CO.

IDAHO

Idle. Office and mine: Burke, Shoshone Co., Idaho. W. W. Russell, pres.; Max Cyr, vice-pres.; T. H. Scott, sec. and mgr.; C. H. Kratzer, treas.; preceding officers, Jas. Girton and Victor Huot, directors. Lands, 7 claims, patented, 3 miles from Burke, having a vein of 17 to 50' width, at surface, traced about 1,200' by trenching, carrying tetrahedrite copper ore. The mine has tunnels of 1,270' and 900', and a 207' shaft, workings cutting a 30' blind vein carrying silver-lead ore. Work was begun Aug. 12, 1904. About 600' of diamond drilling was done in 1909. Equipment includes a good hoist, and a small Rand air compressor, driven by a 6-h. p. motor.

GREENE CANANEA COPPER CO.

MEXICO

Office: 1400 Alworth Bldg., Duluth, Minn. Mine and works office: Cananea, Sonora, Mex. Thos. F. Cole, pres.; Chas. A. Duncan, vice-pres. and treas.; Jos. B. Cotton and Chas. D. Fraser, vice-presidents; preceding officers, Myron M. Parker, Philip L. Foster, Chester A. Congdon, Jas. McLean, Wm. E. Corey and John D. Ryan, directors; Frederic R. Kennedy, sec.; Jos. W. Allen and Daniel R. Smith, asst. secretaries; Wm. G. Hegardt, asst. treas.; Dr. L. D. Ricketts cons. engr.; Jas. D. Douglas, gen. mgr.; John V. Montague, asst. auditor; Jas. V. Doull, mine supt.; Arthur C. Cole, smelter supt.; Frank J. Strachan, mill supt.; Geo. Young, supt. gen. service dept.

Organized Dec. 26, 1906, under laws of Minnesota, capitalization \$60,000,000, shares \$100 par; issued, \$50,000,000. New York Trust Co. and Old Colony Trust Co., Boston, transfer agents; Bankers Trust Co., New York, and State Street Trust Co., Boston, registrars. Shares are listed on the Boston Stock Exchange.

The Greene Cananea is a securities holding company only, but it is practically the only one in which the public now own shares. The relations of the company with its subsidiaries is as follows: The Greene Cananea Copper Co. controls, by stock ownership, the Greene Consolidated Copper Co. and the Cananea Central Copper Co. The Greene Consolidated Copper Co. owns nothing but the entire capital stock of the Cananea Consolidated Copper Co., S. A., Mexico. The Greene Cananea Copper Co. owns all the shares of the San Pedro Copper Co., S. A., of Mexico. The Cananea Consolidated Copper Co., S. A., and the San Pedro Copper Co., S. A., own,

jointly, the property formerly held by the Indiana-Sonora Copper & Mining Co. The company also owns the Superior Bonanza Mining Co. and through this, the Mexican operating company, the Bonanza Mining Co., S. A. The subsidiary corporations named are listed and described elsewhere in this volume, so far as organization, finances and officers are concerned, but the physical properties are described here because the properties are operated together and no description would be complete, or easily understandable, if the properties were described separately. The Cananea Duluth, America Mining, Cananea Development, Sierra de Cobre Mining and Indiana Sonora companies, are all dissolved and no longer exist.

The Greene Cananea exchanged its shares for the stock of the two subsidiary corporations on the basis of $1\frac{1}{2}$ shares for each share of Greene Consolidated, and $1\frac{2}{3}$ shares for each share of Cananea Central, this exchange calling for \$50,000,000 of stock of the Greene Cananea to completely absorb the shares of the Greene Consolidated and Cananea Central.

Cananea is a community of 16,000 inhabitants, located 40 miles south of the international boundary line, on a branch railway of the Southern Pacific Lines of Mexico.

The ores from all of the mines of the various companies are treated at the works of the Cananea Consolidated Copper Co., S. A., the principal Mexican corporation, producing blister copper.

The following description covers all of the subsidiary companies of the Greene Cananea Copper Co.:

The mineral lands held under title from the Mexican government amount to 13,737 hectares, or approximately 33,930 acres. The surface lands owned by the company comprise 140,342 hectares, or approximately 346,644 acres. All of the mines, works, offices, warehouses, stores, etc., of the company are located on its own land and in addition the company owns valuable residence properties in the town site of Cananea, which are occupied by its local officials and employees.

All of the producing mines of the company are situated in the Cananea mountains, which rise from the headwater valleys of the San Pedro and Sonora rivers in northern Sonora. The mines are distributed along a mineral belt, or series of belts, about 6 miles long, in a northwesterly-southeasterly direction, and about 2 miles wide. The oldest geological formation of the Cananea mountains is pre-Cambrian granite, which is overlaid by Cambrian quartzite, in turn overlaid by Cambrian limestone. Breaking through these rocks, and covering much of the mineral belt, is a series of eruptives of Tertiary age, in which 12 different rocks may be recognized, 1, a bedded tuff, the others massive. Three main classes of ore deposits may be recognized: (1) Deposits containing secondary chalcocite together with iron pyrite either massive or disseminated along shear zones in diorite porphyry; (2) Contact deposits containing chalcopyrite associated with iron pyrites and some zinc blende in a matrix of altered limestones; (3) Disseminated chalcopyrite associated with zinc blende in a diorite porphyry breccia.

The producing mines of the Cananea property stated in the order of their location from S. E. to N. W. are, the Cananea, Duluth, Cobre Grande, Kirk, Veta Grande, Capote, Sierra de Cobre, Elisa, Henrietta and Puertecitos mines.

The Cananea Duluth mine has an orebody about 1,200' in length with a maximum width of 200'. This orebody is a neck of diorite intruded in bedded tuffs. The intrusion is shattered, altered and for 200 to 300' below the surface is impregnated throughout with pyrite and copper minerals.

On the 600', the lowest level, the central portion is unpayable and the values concentrated around the border of this long canoe-shaped orebody. The ore carries good silver and gold values. Practically all of the product of this mine is concentrated before smelting.

The Cobre Grande mine was the original mine of the Cananea Consolidated Copper Co. Idle for some years it is now being worked for ore to be used in the converters. The ore occurs in a strong and wide vein traversing both altered limestones and igneous rocks.

The Kirk mine is situated in an extensive area of highly-altered limestone capped with diorite porphyry and cut in places by small irregular dikes and intrusions of the same material. The ore is not adapted to concentration and it is necessary to hand-pick it as mined. The sorted ore carries a desirable high percentage of sulphur and evenly balanced iron and silica.

The great mines of Cananea are the Veta Grande, Oversight and Capote which have had large bodies of high-grade ore and contain great deposits of concentrating ore. This ore and the associated first-class ore contains copper in chalcocite, disseminated through diorite porphyry in broad shear zones.

The Capote mine differs from the Veta Grande and Oversight in that the ore occurs not only disseminated in diorite porphyry but also in crushed quartzite through which the porphyry intrudes. There are 3 principal ore shoots connected by continuous ore on the various levels. The ore in the upper levels is chiefly chalcocite, but the new shoot now being developed, consists of massive pyrite with primary chalcopyrite and bornite. This mine has attained a depth of 1,050', and has ore on each level from the 1st to the 10th. The Capote mine yields both concentrating and direct smelting ores.

Much of the ore is lean pyrite, a mass on the 5th level, 220' long with a maximum width of 100', carries over 2½% copper, but there is much leaner ore in the mine which is unprofitable at present.

The Sierra de Cobre property was acquired by purchase from the Indiana-Sonora Copper & Mining Co. and since its acquisition has proved to be one of the largest and most profitably productive mines of the Greene Cananea Copper Co.

The ore from this mine occurs in limestone. Fissures extending out from the "Eureka" fault have acted as channels for mineralizing solutions, making ore along the veins and for a considerable distance into the walls, replacing the limestone by pyrite and chalcopyrite along the bedding planes. There appear to be notable bodies of heavy sulphides on and below the level of the Combination tunnel which passes through this property to the Elisa mine, and these are now being developed with very satisfactory results. The Sierra de Cobre property also has an extensive area of undeveloped ground lying in the limestone areas, along which smelting ore has been found in the Kirk mine and elsewhere.

The Elisa mine contains a number of lenses of ore lying approximately parallel to a nearly vertical fault between limestone and the diorite porphyry. These lenses occur in the limestone at the fault and back of it for a distance of 150', along a zone some 1,500' in length. The ore consists of a garnet matrix containing chalcopyrite and iron pyrites. It is a very desirable ore for the smelter, being more than self-fluxing, containing about 20% of lime in addition to the iron. Recent developments in the Elisa mine have been exceedingly satisfactory and a large amount of first-class ore has been opened up on the deeper levels. The ore from this

mine is now delivered through the Combination tunnel to bins at the Capote mine.

The Henrietta is a small mine whose ore occurs on a contact between diorite porphyry and quartz porphyry. The orebodies are not large and the ore is silicious. New development work in the vicinity of Henrietta has not yet shown workable orebodies.

The Puertecitos mine and the town of that name are located at the northwest end of the mineral belt and at the terminus of the narrow-gauge railroad of the company. The Puertecitos mine ore deposit has a great outcrop of limestone altered by contact metamorphic action to lime-iron-garnet rock and containing carbonates of copper and some chalcopyrite and bornite. Large areas of this outcrop contain enough copper to warrant mining, which is carried on by means of large quarries. The ore as mined is not sufficiently rich to be sent direct to the smelter but has to be broken and hand-sorted, yielding about 4 tons of waste material to each ton of ore.

Recently a large amount of underground development work has been done at Puertecitos with highly satisfactory results, the ore being fit for direct smelting; the mine is developed sufficiently to yield 450 tons a day if needed.

The Elenita mine, one of the earliest producers of the camp, located southwest of Puertecitos, is being reopened with a view to again putting it in the producing class. The ore from this mine is similar to that of Puertecitos.

Development work for 1911 was 51,874', and for 1912 aggregated 72,403', of which 1,392' was shaft sinking, 13,293' raises and winzes and the balance drift and crosscut work. This development though satisfactory, has not opened up enough new concentrating ore to equal the year's extraction.

The cost of mining was \$2.46 per ton in 1911 and \$2.93 per ton in 1912, the increase being mainly due to increased development, but in part to the charging of general expense to operating costs in 1912.

All of the power used in the operations of the company's mines and works is delivered from a central power plant located at the smelter, and electrical power is used exclusively except for a portion of the concentrators and the steam pumping plant at Ojo de Agua. The power house, also containing the boiler plant, made of concrete and steel, 150x260', contains three 1,500-kw. horizontal Curtiss turbines, delivering current to the switchboard at 2,300 volts. The entire electrical equipment of turbines and engines has a capacity of 5,850 kw. alternating current and 500 kw. of direct current.

The electrical energy is transmitted to various parts of the camp at from 2,300 to 11,000 volts, and supplies the necessary power for a great number of motors of various sizes, electric hoists, pumps, etc. The furnace blast is supplied by 7 Corliss engines and 1 piston blower, having a combined capacity of 176,000 cu. ft. of free air per minute. The blast is conveyed to the furnaces through a pipe 6' in diameter.

The converter blast is supplied by 5 blowing engines having a total piston displacement of 55,000 cu. ft of free air per minute, and is conveyed to the converters through two 30" pipes. In the power house there is also one 6,000-cu. ft. capacity Ingersoll-Rand compound condensing air compressor, furnishing air to the mines for drilling and other purposes; also one 1,200-cu. ft. Ingersoll-Rand compressor which is used to furnish air for ramming converter lining and for sundry pneumatic tools around the works.

The boiler plant has 11 boilers, with a total capacity of 4,260 b. h. p. Crude

oil, imported free from the United States, under a Federal concession, is used as fuel. The waste-heat boiler plant nearby consists of 8 water-tube boilers having a combined nominal capacity of 2,300 b.h.p., heated by the waste gases of 2 reverberatory furnaces. In connection with this waste-heat plant there is a battery of 4 Green economizers, consisting of 288 tubes each. All boilers are equipped with Foster superheaters. The feed water is carefully measured after a simple treatment for the removal of scale-forming material, and is fed to the boilers by means of electrically-operated plunger pumps. The power house is equipped with 2 counter-current barometric condensers, each having a separate water pump and separate dry air pump. All engines are operated condensing excepting those whose exhaust is used in heaters.

The principal water supply of the company comes from Ojo de Agua, 9 miles from the town, where a pumping plant, with water-tube boilers, using crude oil as fuel, runs a Reidler high-duty compound condensing engine delivering 1,500,000 gals. of water per day against a pressure of 967'. A 10" main connects the pumping plant with a 600,000 gal. tank located on a hill near the concentrators. The Ojo de Agua water is used exclusively for domestic purposes and for feed water for the boilers and is delivered under substantial working pressure. A very well equipped fire department, with a complete system of mains to pressure tanks, is maintained. Water from the mines is delivered to the concentrator through wooden pipes and is there used in milling operations.

At the Sierra de Cobre mine, in the Capote basin, there is an Ingersoll-Rand air compressor having a capacity of 2,500 cu. ft. of free air per minute, which is directly connected to a 2,300-volt A. C. motor. This machine is used to boost the pressure in the mains in the outlying districts. A similar machine has also been installed at the Cananea Duluth mine. Fuel oil is stored in 3 main tanks with a capacity of 10,000 bbls. each.

The main shops near the smelter include machine, boiler, blacksmith, foundry, pattern, and electric shops, all well-equipped, up-to-date, and served by both standard and narrow-gauge tracks. A large warehouse, for the company's supplies, and a framing mill, in which timbers for all of the mines are framed, are located on the southern slag dump.

The concentrating department has a capacity of 2,800 tons per day, and consists of a crushing plant, sampling mill, 2 concentrating mills, a settling system and a slime plant. The crushing plant has storage bins holding 2,000 tons, the ore from the mines being delivered in Ingoldsby side-dump cars of 30 tons capacity each. From the storage bins the ore is fed to a 30" conveying belt by automatic feeder.

This belt delivers the ore to 2 grizzlies, inclined at 48° with 1" openings. The screened ore falls on an 18" conveyor transferring it to a 24" conveyor taking it to the mill bins of 4,800 tons capacity.

The oversize from the grizzly goes to two 36" picking belts, where first-class ore and also pieces of wood and steel are sorted out. The ore left on belt is then delivered to crushing bins and fed by automatic plunger feed to five 10x20" Blake crushers of the Cananea type, which reduce the ore to 1½" size. This crushed ore passes to 16x36" rolls, breaking to pieces that which passes a 2" ring. This product is delivered to a 24" conveyor which delivers to the mill bins, together with the grizzly undersize. The crushing plant is electrically driven and has a capacity of 2,000 tons per 10 hours. An automatic sampler at the head of the 24" conveyor cuts one-fortieth of the total ore, which is ground and automatically cut to sample. All rejects drop to elevator and return by conveyor to mill bins.

No. 1 mill, a wooden building with iron roof and concrete foundation,

consists of 2 sections of 600 tons capacity each. No. 2 mill is a steel structure, containing 2 sections of 800 tons capacity each. Both mills are steam driven, crude oil being used as fuel. The mills are supplemented by a settling system and a slime plant containing 100 vanners. The 2 mills have practically the same flow sheet, although in Mill No. 1 fine grinding is carried further in rolls.

The ore from the 4,800-ton storage bins is fed by automatic feeders into each section. Concentration begins on all material finer than 2" ring. The course of the ore in all 4 sections is as follows:

The ore is delivered to two $\frac{3}{8}$ " trommels, the undersize passing to two $\frac{3}{8}$ " trommels. The undersize of the latter goes to two $3/16$ " trommels and the undersize from these to four 2 mm. trommels. The various coarse sizes from screenings are passed to Hartz jigs, and all tailings from jigs coarser than $\frac{3}{4}$ " ring are passed through rolls, elevated and returned to screen, so that no material coarser than $\frac{3}{8}$ " goes to the Hardinge mills. The coarser material is concentrated on 20 concrete Hartz jigs in each section. The jig tailings finer than $\frac{3}{8}$ " pass to 3 Hardinge mills and are ground to about 2 mm. The discharge from the Hardinge mills is deslimed in a drag belt classifier, the coarser sands are classified, the resulting product being treated on 30 tables. The very fine sands and slimes are treated on 36 vanners. Tailings from tables and vanners are settled out and sent to the slime plant for further treatment.

The tailings, containing a gross value of nearly \$2 per ton in copper, silver and gold, are impounded in a coarse tailings dam, the slime settling above the dam. The clear water is pumped back for re-use in the mills but is first passed through precipitating tanks where the dissolved copper is precipitated and recovered. The concentrates are delivered in narrow-gauge cars to the spreading beds.

All ores, concentrates, fluxes and secondaries for blast-furnace treatment are weighed and delivered to the main receiving bins by the company's narrow-gauge railroad. The bin system consists of 11 wooden and 8 steel bins, having a combined capacity of about 3,000 tons. From the receiving bins all material is discharged on a conveyor belt which passes through the sample mill on its way to the spreading bed plant. In the sample mill the ore is crushed to about 4" through a 24x36" Farrel crusher. One-tenth of the ore stream is cut out and passes through a 10x20" crusher of the Cananea type; one-tenth of this is cut and passed through a Gates gyratory crusher, then one-fifth is cut and passed through a set of 17x27" rolls, when the final sample is cut out amounting to about one-four-thousandth of the original material. This final sample is quartered down, dried and prepared for the laboratory. The reject from the sample mill is elevated back to the main conveyor system. All material is sampled in this manner with the exception of concentrates, which are hand sampled.

The ore after passing the sampling mill is conveyed to the spreading beds and distributed evenly over the entire length of the bed by an overhead belt which is automatically tripped. The bedding plant is of steel construction, being 453' long, and 198' wide, and contains 3 ore beds of about 9,000 tons capacity each. The composition of each bed is known in advance and in this way an even mixture is assured to the furnaces. When a bed is completed it is reclaimed by a machine which advances into the face of the pile and discharges on to a conveyor which delivers the mixed charge into bins over the blast furnaces, each bin having a capacity of 75 tons. The reclaiming machine has a capacity of about 175 tons per hour. The charge is dropped by gravity from the 75-ton bins above the furnaces

into measuring hoppers holding 2,000 lbs. There are 5 such hoppers to each furnace, and these are discharged either directly into the furnace or on to the feed floor by means of arc gates.

Advantage was taken of the close-down in the panic of 1907 to remodel the smelting works, since which time the entire reduction works have been practically rebuilt. The bedding and reclaiming system was put in operation, the furnaces and converters in the old plant were scrapped and an entirely new and larger installation made, with the result that the plant is now considered one of the most efficient and up-to-date plants in the copper industry. The following notes describe the reconstructed reduction works:

The blast-furnace building is of steel construction, 312' long by 33' wide. It contains 8 blast furnaces, 48x210" at the tuyeres. There are 4 settlers, 10' 5" x 19' inside of brick lining, each settler serving 2 furnaces. The slag overflows continuously into self-dumping slag cars of 45-cu. ft. capacity. Trains of 6 to 8 cars are hauled to the dump by electric locomotives. The matte is tapped from the settlers into 66-cu. ft. cast-steel ladles and transferred to the converters by electric cranes.

The gases from the furnaces are discharged into a steel balloon flue 10' in diameter, thence through 2 cross flues, 12' 6" in diameter, and 2 goose necks, 8' 6" in diameter, into the main brick dust chamber having dimensions of 60' x 181' x 32' 6". From this main chamber the gases pass through a flue 20' x 242' x 19' 6", to another chamber 84' x 34' 8" x 23' 6", thence to a brick-lined steel stack having an inside diameter of 18' 3". The stack is 168' high from the foundation, which is 25' in height. All flue dust is drawn from the dust chamber and balloon flue into small cars and trammed to the reverberatory furnaces. The coke bins are located at the west end of the furnace building and have a capacity of about 3,000 tons. Coke is wheeled to the furnaces in barrows and shoveled in by hand.

The roaster building is of steel construction and contains ten 18' six-hearth McDougal calciners. The roaster dust chamber is of brick and has dimensions of 115' x 25' x 15'. There is a special bedding plant for the roasters, consisting of 4 bins of 500 tons capacity and 2 beds of 3,000 tons each. The mixed roaster charge is reclaimed and delivered by conveyor belts into 60-ton bins over and charging into the roasters. The roaster product is hauled by electric motor in 5-ton cars to the reverberatory furnaces.

The reverberatory plant consists of two 19' 6" x 100' oil-fired furnaces. The waste gases fire three 300-h. p. and five 250-h. p. boilers placed parallel, and then pass through 4 units of Green economizers containing 1,152 tubes, thence through a brick flue 130' long to a stack 12' 6" in diameter by 152' in height. The slag is skimmed into 112-cu. ft. electrically-tilted slag cars and hauled to the dump by electric locomotive. The matte is tapped into 66-cu. ft. ladles and hauled to converter building in ladle cars, from which it is transferred to the converters by electric cranes.

The converter building is of steel 65x518', and 56' to bottom chord of truss and contains 3 electric cranes of 40, 50 and 60 tons capacity, 6 electrically-operated stands of the Great Falls type of converter, with 7 basic-lined shells, 12' in diameter, for same.

The copper from the bessemer converters is poured into the ladles of 2 straight-line electrically-operated casting machines each equipped with tilting ladles of 66 cu. ft. capacity. Each machine has a chain of 39 molds, casting bars weighing about 260 lbs., dumping into bosh from which they are removed by drag conveyor to the bullion platform. The bar bullion is then stacked by an air-operated radial crane, picked up on trucks, weighed,

and loaded into standard-gauge railroad cars. The converter slag is skimmed into 66 cu. ft. ladles, transferred by crane to 45 cu. ft. slag cars, hauled by electric motor to pits and reclaimed by a 10-ton steam shovel. It is then delivered in narrow-gauge cars to the receiving bins of the main spreading bed system.

The converter gases pass through balloon flues of steel construction, 10' in diameter and 201' in length, and enter into a steel dust chamber, 104' x 26' x 20', with a circular arch roof having a 13' radius. The gases then pass to a steel stack 12' in diameter by 125' high.

The daily capacity of the entire reduction works is 3,600 tons of gross charge.

The company owns and operates 36 miles of standard and narrow gauge railway, including branches, spurs and sidings. The narrow-gauge line is double tracked from the smelter to Capote basin, and laid with 50-lb. steel rails. The equipment includes 2 standard-gauge and 9 narrow-gauge locomotives, all oil burners, and about 140 cars, most of which are 25 and 30-ton steel ore cars. The railway system has direct rail connection with the Nogales and Naco branches of the Southern Pacific Lines of Mexico, and by this line with the El Paso & Southwestern railroad at Naco, Ariz.

The Cananea Consolidated Copper Co. operates practically all of the public utilities in Cananea. Its Public Service Department operates the water system, from which there was delivered to the public in the year 1912 upwards of 60,000,000 gals. of water; an electric light system; a telephone system operating 200 drops and approximately 450 telephones; and sundry other minor public utilities. The company's Mercantile Department operates a lumber yard, a large department store located near the smelter and 9 branch stores scattered throughout the various camps. The rental properties of the company include 619 buildings, consisting of rooming houses for its employees, residences, bunkhouses, etc.

During the year 1912 the mines produced 1,074,822 dry tons of ore, of which 417,341 dry tons went directly to the smelter and 657,482 dry tons to the concentrators. The concentrating ore produced 176,872 dry tons of concentrates.

The total production for the year 1912 was: Copper, 48,157,847 lbs.; silver, 1,457,308 ozs.; gold, 7,197 ozs. For 1911, the production, from the company's own ores, was 37,101,119 lbs. copper, 795,160 oz. silver and 3,610 oz. gold; the total production for the year was 44,897,466 lbs. copper, 1,295,297 oz. silver and 5,892 oz. gold.

GREENE CONSOLIDATED COPPER CO.

MEXICO

Office: Room 2027, 42 Broadway, New York. Mine office: Cananea, Sonora, Mex. Wm. D. Thornton, pres.; C. D. Fraser, vice-pres.; preceding officers, F. E. Searle, Alfred Romer, P. L. Foster and Geo. Notman, directors; J. W. Allen, sec.-treas.; Dr. L. D. Rickett, gen. mgr. Organized Sept. 16, 1899, under laws of West Virginia, capitalization increased, 1904, and again increased, 1906, to present amount of \$10,000,000, shares \$10 par. Has paid 25 dividends totaling \$8,044,400 to March 1, 1913. Annual meeting, second Tuesday in June.

The only asset of the Greene Consolidated Copper Co. is the total stock issue of the Cananea Consolidated Copper Co., S. A., a Mexican corporation.

The Greene Consolidated Copper Co. is controlled, through ownership of 951,859 shares, by the Greene Cananea Copper Co. Financial statement is included under description of the Cananea Consolidated Copper Co., S. A., which is to all intents and purposes the same company under another

name. The mines and other properties of this and of all affiliated corporations are described under title of the Greene Cananea Copper Co.

This company was organized and controlled by Col. Wm. C. Greene and his friends until Feb. 18, 1907, when the old board resigned, en masse, and immediately thereafter a new board was elected, under the control of Messrs. John D. Ryan and Thos. F. Cole. The early history of the company and the reasons for this change of control are fully given Vol. X.

GREEN MONSTER MINE.

NEVADA

Idle. Office: care of Mrs. Phoebe Hearst, owner, San Francisco, Cal. Mine near Sandy, Lincoln Co., Nev. Mine, opened by a 325' two-compartment vertical shaft, shows carbonate and sulphide ores, latter including argentiferous galena and chalcopyrite, and has been claimed to show about 5,000 tons of \$40 ore.

GREEN MOUNTAIN COPPER MINES.

CALIFORNIA

Mine at Raymond, Madera Co., Cal. O. R. Sydney, mgr.; W. R. Sundberg and J. L. Sydney, owners. Mine, in southeastern part of Mariposa county, 7 miles northwest of Raymond on S. P. R. R. and 12 miles from La Grande on the Santa Fé R. R. Property, 14 claims, the Copper Queen, patented, balance unpatented, has been worked at various times since 1863 and has produced considerable high-grade oxidized ore. Claims show a gossan outcrop of 300 to 1,200' width, between diorite and granodiorite. Mine has 2 main tunnels, the lower, or eastern, being about 600' long, with several thousand feet of workings, and there also is a new shaft, showing carbonate copper ores. Long continued leaching has given many of the old mine workings a coat of bluestone. In the eastern tunnel, the east drift shows a 125' body of cupriferous pyrrhotite, and the western drift has a 60' orebody, reported to carry chalcocite, with cupriferous pyrrhotite. Mine was working, on a small scale, 1911, producing carbonate ore carrying up to 20% copper and 16 oz. silver and shipping low-grade sulphide ore to Globe, Ariz., to be used as a flux. Property considered promising.

GREEN MOUNTAIN GOLD & COPPER MINING CO.

UTAH

Letter unclaimed at Salt Lake City, Utah. Mine at La Sal, Grand Co., Utah. Samuel E. McGraw, pres.; W. J. Martin, vice-pres., sec.-treas.; J. E. McGraw, mgr., at last accounts. Organized May 22, 1909, under laws of Utah, capitalization \$500,000, shares \$1 par. Lands, 8 claims, unpatented, 30 miles from a railroad, opened by tunnel, with about 450' of workings. Company ended 1910 in litigation, with bad charges against the management, and a special auditor was appointed by the court to investigate the charges. Reported, 1913, as contemplating building a mill.

GREEN MOUNTAIN MINING & MILLING CO.

COLORADO

Office: 1538 H. W. Oliver Bldg., Pittsburgh, Pa. Mine office: Howardsville, San Juan Co., Colo. In Feb., 1911, receiver was appointed at request of E. E. Dick, secretary of the company. Property, a gold mine with some copper ore. Fully described Vol. X.

GREENBACK COPPER CO.

CALIFORNIA

Mine at Woody, Kern Co., Cal. Joseph Weringer, owner. Lands, 1,520 acres, 18 miles east of Jasmin, on the Porterville branch of the Southern Pacific railroad. Country rock is granodiorite, showing an ore zone carrying lenses of 20' maximum width, with granite walls irregularly impregnated with chalcopyrite. Development is by a 185' incline shaft, with 3 levels opened. Carbonate ores stoped from the upper levels have averaged 19.4% copper and 5.7 oz. silver per ton. Work resumed, 1913, after several years and 1 carload of copper ore shipped to Selby smelter.

GREENHORN MINE.

CALIFORNIA

Owned by F. and H. Warren. Mine near Tower House, 22 miles from

Redding, Shasta Co., Cal. Reported to have struck ore at 280' from surface averaging 17% copper and \$1.50 gold per ton. Daily output about 13 tons.

GREENWATER COPPER MINES & SM. CO.

CALIFORNIA

Office: care of Donald B. Gillis, mgr., Tonopah, Nev. Chas. R. Miller, pres.; M. R. Ward, vice-pres.; Lloyd E. Marsden, sec.-treas.; preceding officers, Max E. Bernheimer, Chas. Gold, W. G. Benham, Clyde Milne, Oscar A. Daube, Jos. G. Butler, Jr., S. A. Browan and W. H. Drayton, 3rd, directors. Organized Dec. 12, 1906, under laws of Delaware, capitalization \$25,000,000, shares \$5 par. Is a securities holding company only, and owns stock in a number of Greenwater promotions, described Vol. VIII, all of which are dead. Company, on Dec. 31, 1910, had \$144,727.50 invested in choice' bonds, after losing about \$170,000 through the failure of Chas. Minzesheimer & Co., New York brokers, who failed, Oct. 15, 1910.

In Aug., 1911, company leased for 49 years, the O. K. and Supply groups, gold mines at Dale, Cal., and is now developing same, the 800' north drift showing a new vein 3' wide of good ore. A 10-stamp mill and cyanide plant are now in operation.

GREY'S SIDING DEVELOPMENT CO., LTD.

ONTARIO

Property is 3 miles from Grey's Siding, T. & N. O. R. R. Owns the Little Dan mine on Arsenic lake. John McMartin, pres.; William Marshall, managing director; J. E. Wilson, supt. at last accounts. Property consists of 3 claims covering diorite containing bunches and impregnations of arsenical pyrite and chalcopryrite carrying several dollars per ton in gold. Deposit opened up by open-quarry work and by 60' shaft. Property was shipping 4 carloads of ore a day in 1909, was idle in 1910 but has been developing since.

GRIBBELL ISLAND COPPER CO.

BRITISH COLUMBIA

Office: 203 First National Bank Bldg., Bellingham, Wash. Mine at Gribbell Island, Skeena River division, Cassiar district, B. C. Geo. Robertson, pres.; Andrew Gaasland; vice-pres.; W. J. Hughes, sec.-treas.; preceding officers and Geo. Graham, directors. Organized under laws of Washington, capitalization \$170,000, shares 10 cts. par, nonassessable; issued, \$145,000.

Lands, 8 claims, crown-granted, area 400 acres, at the southern end of Gribbell island, facing Mackay reach, and 3 miles west of Ursula channel. Property shows a fissure zone in syenite, carrying massive bornite, chalcopryrite and gray copper, giving assays of 5 to 50% copper, with small and variable silver and gold values. Developed by several pits, opencuts and 3 tunnels of 275', 160' and 375'. Idle since 1906, owing to lack of funds.

GRIFFITH CONSOLIDATED MINE.

COLORADO

See Salida Copper Co., Colo., which owns mine through stock ownership in Mountain Mining Co.

GRIZZLY MINE.

OREGON

Address: Cottage Grove, Lane Co., Ore. Property has an orebody reported to be in a porphyry dike 20' wide, the vein showing good walls with 12" of high-grade ore on the foot walls, 4' consisting of mixed lead and copper sulphides with gold and silver values. The discovery is a mile from the mill and 2,000' lower.

GRIZZLY MINING CO.

UTAH

Succeeded by Michigan-Utah Mining Co., March, 1912.

GRUTLI MINING CO.

UTAH

No trace of operations secured. Formerly at 37 Commercial Bldg., Salt Lake City, Utah. Mine at Eureka, Juab Co., Utah. See Vol. X.

GUADALUPE; MINA.**MEXICO**

Probably closed down. Mine at Muleros, Nombre de Dios, Durango, Mex.

GUANACEVI TUNNEL CO.**MEXICO**

Address: Room 2009, 55 Liberty St., New York. Mine at Guanaceví, Santiago Papasquiaro, Durango, Mex. Organized 1904, under laws of Arizona, capitalization \$5,000,000, shares \$5 par. Property in hands of trustee until conditions in Mexico permit of financing company sufficiently to carry on the extensive development planned.

Lands are 22 properties, about 700 hectares, including timber rights and original concessions, said to possess large bodies of gold and copper ore. The mine has 3 shafts, of 100' depth each, with tunnels of 1,250' and 1,400', the main tunnel, 7x9', being planned to be driven about 3 kilometers, management estimating that in this distance a large number of veins carrying auriferous and argentiferous lead and copper ores should be cut, the tunnel being estimated as likely to cost about \$250,000. In September, 1907, the mine had 3,542' of workings.

The Mexican Western railroad is now building from Tepehuanes to Guanaceví, which adds materially to value of property.

The management denies, with asperity, that the L. Diamond Co., of Boston, was ever at any time a representative of this corporation in any way, and states that a number of brokers bought this stock and immediately combined to boom it and unload on the public at unduly high prices. Company reports that under the new management no stock has been sold.

GUAYMAS SMELTER.**MEXICO**

See Pacific Smelting Co.

GUERRERO COPPER CO.**MEXICO**

Probably dead. Letter unclaimed at Chilpancingo, Guerrero, Mex. Lands, 8 miles south of the Rio Balsas bridge, on the Mexican Central railway, showing ore said to assay 13% copper and 40 grams gold per metric ton.

GUERRERO MINING CO.**MEXICO**

Is the Mexican incorporation of the Victor Mining & Smelting Co., which owns 2 properties in Magdalena district, Sonora, Mex., 10 miles southwest of Cananea. Properties about one-half mile apart, containing 15 and 32 pertenencias, respectively.

GUGGENHEIM EXPL. CO.**UNITED STATES & MEXICO**

Office: 165 Broadway, New York. Mexican office: Tiburcio 27, Mexico, D. F. Daniel Guggenheim, pres.; Morris Guggenheim, vice-pres.; Chas. K. Lipman, sec.; Leopold Friedrich, treas.; S. R. Guggenheim, H. P. Whitney and Morris Guggenheim, managing directors; Pope Yeatman, gen. mgr. and cons. engr.; preceding officers, John Hays Hammond, O. B. Perry, Isaac Guggenheim and Geo. S. Field, directors; John K. MacGowan, purch. agt.

Organized June, 1899, under laws of New Jersey, capitalization \$6,000,000, increased 3 times, lastly in July, 1906, to \$22,000,000, shares \$100 par reduced to \$25 par, April, 1912; issued, \$20,793,300. D. A. Crockett, transfer agent; Guaranty Trust Co., New York, registrars. Annual meeting, first Tuesday in June.

Company controls a number of important mining companies. The assets, Dec. 31, 1912, were: American Smelters Securities Co. "A," 44,000 shares, valued at \$3,960,000; Utah Copper Co., 404,504 shares, valued at \$9,161,767; Yukon Gold Co., 2,834,885 shares, valued at \$10,091,189; Chino Copper Co., 97,750 shares, valued at \$2,534,802; American Smelting & Re-

fining Co., common, 69,500 shares, valued at \$4,767,264; Ray Consolidated Copper Co., 121,200 shares, valued at \$2,585,638; Alaska Yukon properties and equipment, \$1,144,101. Net earnings were equal to 14.7% on issued stock in 1909, and were 16.1% in 1910. Regular dividend rate is 3% quarterly and total dividends paid to end of 1912 were \$14,689,995.

Profits in excess of dividends, Dec. 31, 1912, \$1,192,420. Surplus, Dec. 31, 1912, \$23,814,632.

The main business of the company is the development of mines as an industry and only in exceptional cases does it float and promote mining companies.

GULF COPPER CO.

MEXICO

Head office: Phoenix, Ariz. Branch office: Room 405, Timken Bldg., San Diego, Cal. Mine at Angeles Bay, Gulf of California, Mex. Capitalization \$1,000,000, shares \$1 par. J. H. Baker, pres. and gen. mgr.; G. E. Anthony, mg. engr.; J. H. Loudon, directors.

Property consists of 40 hectares, about 100 acres, at north end of Angeles bay, 140 miles northwest from Guaymas and about 90 miles southwest from Port Lobos. Claims show silicious schists cut by porphyry dikes and a vein running northwest, dipping at 45° and varying from 5 to 42' in width. Ore black oxide and sulphide of copper said to average 4.7% with trace of gold and silver.

Development by tunnels with 1,363' workings, including winze sunk on vein 175'. Has shipped 300 tons, 25% picked ore and has several thousand tons of low-grade ore on dump. Property considered promising if properly financed and handled.

GUNN'S PEAK COPPER MINING CO.

WASHINGTON

Idle. Letters to 217 Columbia St., Seattle, Wash., unanswered. Mine at Index, Snohomish Co., Wash. Said to be controlled by the Index-Bornite Copper Mining Co. Lands, 4 claims, showing 3 veins, widest said to be 25' carrying chalcopryrite and bornite, average assays 11% copper and 2 oz. silver per ton. Has tunnels of 125' and 800'.

GWIN MINE DEVELOPMENT CO.

CALIFORNIA

Mine at Gwin Mine, Calaveras Co., Cal. This famous old gold mine, whose deeper ores carry copper, is now closed down. See Vol. X.

GWINN MINING CO.

WASHINGTON

Office: Meteor, Ferry Co., Wash. Company owns a group of claims in the Meteor, or Covada, district, showing fissure veins in sedimentary rocks cut by diorite and carrying complex ore said to average about \$16 per ton in gold, silver, copper and lead. Development by shafts and tunnels, blocking out considerable low-grade ore which will be treated in concentrator now in course of erection. Company is also erecting a dam on Hall creek for its hydro-electric plant.

HACHITA COPPER DEVELOPMENT CO.

NEW MEXICO

Idle. Letter to El Paso office, Tex., unclaimed. Mine near Hachita, Grant Co., N. M. W. R. Thurston, pres.; Thos. A. Lister, gen. mgr. Organized 1907, under laws of New Mexico, capitalization \$200,000, shares \$1 par. Lands, 22 claims, near the Anderson-Apache mine, in the Apache district, 7 miles south of Hachita, said to carry about 7,000' of the McKinley fault. Mine has 2 shafts, known as the Star and Quien Sabe, latter, of 110', said to show a vein of about 40' width, carrying low-grade disseminated copper sulphides. Company inactive for several years and not favorably regarded.

HAGGARTY COPPER MINING CO.

WYOMING

Idle. Office: Electric Bldg., Cleveland, Ohio. Mine at Rudefeha, Carbon Co., Wyo. L. N. Pennock, pres. Organized with capitalization

\$10,000, increased, Nov. 9, 1908, to \$1,500,000, shares \$1 par. Is controlled and owned by the United Smelters, Railway & Copper Co. Is a companion of the Ferris Haggarty Co., but like all its sister companies owned by the U. S. R. & C. Co. is bankrupt. No one but a lawyer can tell which of the two owns the copper mine that has been the bait for so many "investors."

HAHN'S PEAK GOLD MINING & MILLING CO. COLORADO

Office: 55 High St., Oshkosh, Wis. Mine at Hahn's Peak, Routt Co., Colo. Organized Jan. 29, 1906, under laws of Colorado, capitalization \$1,000,000, shares \$1 par. E. E. Meeleus, pres.; C. A. Spencer, vice-pres.; Patrick Magill, supt.; H. O. Granberg, sec.-treas. and gen. mgr.; H. C. Beeler, cons. engr.; preceding officers, Dr. H. A. Wolter, H. C. Sibree and W. E. Brown, directors.

Owens 25 claims, 248 acres, patented. Development consists of 950' tunnel on Royal Flush claim said to cut 5 veins and the 2,100' Conundrum tunnel 430' lower, cutting 12 veins, values being principally gold and silver. Shipped 200 sacks of high-grade ore to the smelter in Sept., 1913.

Equipment includes gasoline engines, compressor, air drills, blower and a 400-ton concentrating mill under construction.

HALE MINING & MILLING CO. ARIZONA

Mine office: Constellation, Yavapai Co., Ariz. Felix X. O'Brien, supt. Has gold and copper ores, with gasoline power. Company has kept up assessment work on claims, but is otherwise inactive.

HALL CREEK MINING & MILLING CO. WASHINGTON

Mine office: Daisy, Stevens Co., Wash. Herman Camerer, supt. Property, the Gwin mine and group of claims, showing a fissure vein carrying gold-copper ore, developed by 400' shaft. Equipment includes steam plant and water power, hoist and 4-drill Fairbanks air compressor. Has a 75-ton concentration mill; employing about 25 men at mine and mill.

HALL MINING & SMELTING CO., LTD. BRITISH COLUMBIA

In liquidation. Office: 79½ Gracechurch St., London, E. C., England. Smelting plant at Nelson, B. C., destroyed by fire Sept., 1911. Fully described Vol. VIII.

HAM GROUP WASHINGTON

D. F. Ham, mgr., Chewelah, Wash. Property owned by D. F. and H. A. Ham, W. H. Montgomery and Geo. C. Allen. Mine, the Washington claim on Monarch mountain, shows 6' vein of copper sulphide ore with silver values, uncovered in trail building, after 3 years' failure to find it by tunnel and trench work.

HAMBURG-AMERICAN COPPER M. & M. CO. IDAHO

Office: Kellogg, Idaho. Wm. Schaefer, pres.; D. W. Price, vice-pres.; J. A. Walden, sec.; W. W. Papesch, treas.; Elmer Brown, Paul Jacobs, H. Froehlich and Frederick Bell, directors.

Organized Nov., 1908, under laws of Idaho, capitalization \$1,500,000, shares \$1 par. Lands, 8 claims, between the Handspike and Riverside, on the Little North fork. Development by tunnel 749'. Property shows copper ore. Mine 18 miles from O. W. R. & N. Co.

HAMILTON-MONTANA GOLD MINING CO. MONTANA

Richard Daxon, mgr. Company owns group of claims in Missoula Co., Mont. Developed by 400' tunnel, expecting to cut orebody at 700'. Values mainly copper with some lead.

HAMILTON POWER, MINING & TRANSP. CO. NEVADA

W. B. Bierce, pres., McGill, White Pine Co., Nev. Mine in Rocco canyon, near Hamilton, White Pine district, Nev. J. D. Teasdale, vice-pres. and sec.; Wm. Harwood, mgr.; preceding officers, R. G. Henke and John Blair, directors.

Property the Grand Prize group, held under lease and bond from Chas. Minolette and Louis Hani, of Hamilton. Mine comprises 5 claims and power rights on Illipah creek. Ore is a carbonate carrying copper, lead and silver.

Development by 235' tunnel cutting ledge at 165' with 36' winze in ore. Shipments in 1913, of 20 tons sacked, averaged \$84 a ton, assaying 6.40% copper, 20.5% lead and 107 oz. silver. Shipments averaged 60 tons a month for summer of 1913.

HAMLET MINING & MILLING CO.

COLORADO

Office: Howardsville, San Juan Co., Colo. Isaac Hughes, supt. Property, the Hamlet mine developed by tunnels, longest known as Mill tunnel, 500' below 5th level of old mine workings, connected by raises with tunnel. Ore a complex mixture of copper-lead and zinc sulphides carrying good gold and some silver values.

Equipment includes steam power plant, compressor and concentrating mill. Company employs about 15 men.

HAMPTON CONSOLIDATED MINES CO.

COLORADO

Idle. Granville I. Chittenden, agt., 200 E. and C. Building, Denver, Colo. Mine at Russell Gulch, Gilpin Co., Colo. Organized under laws of Colorado, capitalization \$3,000,000, shares \$1 par. Company announced, early 1908, that it would be paying dividends semi-annually, declaring its first dividend March 30, 1908, but apparently no dividends have been paid. Company is now, 1913, entirely without funds and indebted to Chittenden estate for taxes, etc., and the widow of W. H. Chittenden, the organizer and moving spirit of the company, is practically the owner.

Lands, 4 claims, patented, very close to the War Dance gold mine and believed to carry an extension of the ore shoot of that mine. The western, or 80' shaft of the Hampton, might strike this ore at 250'. The ore has bornite, tetrahedrite, pyragryite, pyrite and marcasite, carrying copper, silver and gold values, giving assays of 2.7 to 35% copper, 6 to 35 oz. silver and 0.16 to 5.4 oz. gold per ton. The mine has a 250' tunnel, and shafts aggregating 300', with about 3,000' of workings, management estimating, 1908, that the mine had 36,000 tons of ore in sight.

Equipment includes a 16-h. p. gasoline engine. Some ore has been shipped, averaging \$25.83 per ton. In 1912, leasers were mining in eastern part of property, but production was small. Property believed to have merit, but company unable to develop it.

HAMSTADT; G. H.

CALIFORNIA

Probably idle. Office: Barnwell, San Bernardino Co., Cal. G. H. Hamstadt, owner and mgr.; J. O'Brien, supt., at last accounts. Lands, 8 claims, 160 acres, near Barnwell on the A. T. & S. F. R. R., in the New York district, showing contact deposits between limestone near granite. The mineralized zone is reported to average 40' in width, 1,000' in length and proven for 600' in depth. It carries sulphide ores giving assays of 8% copper, a trace of silver and \$12.30 gold per ton. Mine is developed by tunnels of 93', 250' and 600'.

HANAUER SMELTING WORKS.

UTAH

At Salt Lake City, Utah. Controlled through stock ownership by American Smelting & Refining Co.

HANCOCK CONSOLIDATED MINING CO.

MICHIGAN

Office and mine: Hancock, Houghton Co., Mich. John D. Cuddihy, pres.; Capt. Thos. Hoatson, vice-pres.; John H. Hickok, sec.-treas.; preceding officers, Allen F. Rees, Capt. Samuel B. Harris, Capt. Jas. Hoatson and Frederick W. Nichols, directors; John L. Harris, gen. mgr.; Richard

Coombs, mg. capt.; Daniel Fisher, clerk; C. W. McDougall, engr.; Fred G. Schubert, master mechanic.

Organized June 11, 1906, under laws of Michigan, capitalization \$5,000,000, shares \$25 par; issued, \$2,200,000, paid \$22, including an assessment of \$2 levied Dec., 1911. Company began business with \$1,000,000 and paid \$552,623 for its property. Disbursements were \$264,538.98 in 1907; \$205,289.60 in 1908; \$279,973.34 in 1909; \$383,413.95 in 1910; \$359,278.07 in 1911; \$267,542 in 1912. Company ended 1912 with quick assets of \$120,928 and accounts payable of \$134,514. Old Colony Trust Co., Boston, registrar; State Street Trust Co., Boston, transfer agent. Annual meeting, third Wednesday in June.

The Hancock after several years development work is now nearing the producing stage.

Property consists of 936 acres of mineral territory, immediately west and south of the old Quincy mine, in T. 55 N., R. 34 W., including the original Hancock mine, area 136 acres, set aside, 1859, by the Quincy Mining Co., which reserved the mineral rights to the Pewabic bed. The Pewabic bed, on lands other than the original Hancock tract of 136 acres, is owned by the Hancock Consolidated. Lands carry the Pewabic, Quincy, West and Hancock or Sumner copper-bearing beds. While the Quincy Mining Co. claims the right to mine the Pewabic bed on the lands of the old Hancock Mining Co., the Hancock Consolidated claims that the Quincy has done unauthorized mining on its lands and there is a possibility of litigation over mining rights. Perhaps the best part of the Quincy mine is tributary to No. 7 shaft, which is immediately north of the Hancock boundary. Company purchased, July, 1909, lots 6 and 7, Sec. 28, for a mill site, this providing necessary sand room for the mill, which it is planned building near the center of the N. W. $\frac{1}{4}$ of Sec. 27, about a half-mile back from the shore of Portage lake.

The old Hancock mine, opened 1859, name changed to Sumner, and changed back to Hancock, was closed June 1, 1885, on account of the low price of the metal, after producing 5,709,384 lbs. fine copper. The Hancock or Sumner amygdaloidal bed, which was worked by the old Hancock company, averaged about 12' in width below the fifth level, to a depth of 1,052', where the old mine was bottomed and in the latter years of its operation returned 21 to 22 lbs. fine copper per ton, after selection, making about 50 tons of mineral monthly, secured from an average daily production of 210 tons of rock. Modern milling methods should save 2 to 4 lbs. fine copper per ton formerly lost. The old mine found occasional masses up to 5 tons in weight.

The property carries the Keweenaw series of amygdaloidal traps and intercalated conglomerates, and has 4 known copper-bearing beds, the Pewabic being the most important. The property also carries the underlay, but not the outcrop, of the 3 copper-bearing beds of the Quincy, these being the Quincy to the eastward, apparently of little value, followed by the Pewabic, which is the main bed of the Quincy and the so-called West lode of the Quincy. The known copper-bearing beds outcropping on the Hancock property are the Hancock or Sumner, mined in the old Hancock mine, and now known as No. 1 lode, lying about 1,100' west of the Pewabic; the Old West bed, now known as No. 2 lode, lying about 300' west of No. 1, and the New West bed, now known as No. 3 lode, lying about 75' west of No. 2. Beds 1 and 2 vary from 250 to 300' distance apart, and No. 3 is 50 to 100' west of No. 2. No. 1 is 7 to 12' in width, No. 2 is 10 to 12' in average width, and No. 3 is 12 to 14' in width. Beds 1 and 2 are opened by No. 1 incline shaft and all 3 are opened by No. 2 vertical shaft. The 2

shafts are connected on the 13th level by a 1,275' crosscut and on the 18th level by a 50' crosscut. The old Hancock mine, in addition to the main shaft, now known as No. 1, has an air shaft.

No. 1 shaft is the old main shaft of the Hancock mine, formerly 8x16', with 2 small skipways sunk at an angle of 54°, but deepened below the old workings with size 8x21', having 3 compartments. Old levels are at 100' intervals, to depth of 900', below which levels are opened at 125' intervals, to depth of 1,600' at the 14th level, where the shaft is bottomed temporarily. The old mine was found in bad shape, the hanging wall giving much trouble and requiring very close timbering. The old workings were about 800' in length, with ground stoped from the 2nd to 10th levels, inclusive, on the Hancock or No. 1 bed, and stoped from the 6th to 9th levels, inclusive, on the southern drifts in the Old West or No. 2 bed. No. 1 shaft has a remodeled wooden shaft rock house, with a Lake Shore hoist good for 2,000' depth.

The new and main working shaft known as No. 2, is 2,200' northwest of No. 1. It is vertical, with dimensions 9' 6" x 29' 6", being the second largest in the Lake Superior district, and is 4,001' deep. The shaft has 4 hoisting compartments, each 7x5' 2" in the clear, with a 4x7' compartment for ladderway and pipes. The collar is concreted for a depth of 30' into the rock ledge with a thickness of 24" of concrete at the top and 30" at the bottom. This shaft intersects No. 3 bed at a depth of 2,038', the bed here showing a pitch of 37°, compared with 47° in the upper workings, this flattening of 10°, at depth, corresponding to a similar flattening shown to the northeast in the No. 7 shaft of the Quincy. The No. 4 lode is intersected by the shaft at a depth of 3,105'; it is 17' thick and carries payable ore. Ground below the 53rd level, 4,000' from surface, will be reached by 2 subsidiary shafts sunk from the 49th level, connecting with the No. 2 shaft through chutes to the 53rd level and through drift connections on the 49th level.

Considerable drifting has been done on No. 3 bed, and on No. 2, No. 3 being opened by a winze from the 10th to 18th levels, inclusive, with drifts on the 9th to 18th levels, inclusive, several of which are more than 1,000' long. No. 2 shaft has loading stations on the 13th, 18th, 23rd, 27th, 34th, 39th, 44th, 49th and 53rd levels, to which rock broken will be sent by chutes from the levels above. Cutting-out stopes were begun, late 1910, on the 13th, 14th, 15th and 16th levels, preparatory to making a mill test at the Allouez-Centennial mill which was started April 18, 1911.

No. 2 shaft has a shaft rock house that is the most modern in the Lake Superior district. The structure is of steel, resting on concrete abutments 14' high by 35' in diameter. The building has a total height of 128', with working floor 60' above the ground. The bins are of 1,000 tons capacity each. Equipment includes two 50-ton Farrell crushers with 24x36" jaws and a smaller crusher to treat waste rock required for concrete or macadam. The 2 large crushers are fed by 2 steel traveling-belt picking tables, each about 20' long and 6' wide, having sections with 2" slots and 2" cross bars, forming a grizzly for all small rock to pass through, only large rock going to the crushers. The large crushers each have a 50-h. p. induction motor and each picking table has a 10-h. p. induction motor. Two men per shift are expected to do all work on the crushing floor.

The main engine house at No. 2 shaft is of steel, 60x94', with a 50x50' wing for the compressor plant. There are 2 hoists, the main engine being a Sullivan Corliss direct-connected hoist having 36x72" steam cylinders, with a 15x15' straight-face drum, operating 2 skips in counterbalance, with capacity to lift a cage, with a Kimberly skip swung under, weighing 5 tons,

hoisting 8 tons of rock from a depth of 4,000', at a steam pressure of 150 lbs. There also is a Sullivan first-motion hoist with 24x48" cylinders and 2 loose drums, 8' in diameter with 9' face, driven by band-friction clutches, with automatic stop, calculated to operate 2 pairs of Kimberly skips, in balance, at a speed of 3,500' per minute, hoisting with 1¼" steel cable.

The steel compressor house having an electric traveling crane, covers 13-drill and 16-drill air compressors and a new 35-drill tandem-compound air compressor.

The 56x98' steel boiler house has 2 batteries of 4 return tubular boilers, each 72" in diameter and 18' long. The boiler house smokestack, built of reinforced concrete, standing on a 12' base, is 130' high, of 13' outside diameter at the base and inside diameter of 7' 6", the first 40' being brick-lined.

Buildings at No. 2 include a machine shop and a 30x80' smithy. There also are an office, changing house and a number of dwellings. The main plant at No. 2 shaft is reached by a spur of the Mineral Range railway. Company employs about 200 men when running full time.

A mill test for 6½ months, made in 1911, showed that a recovery of 18.21 lbs. copper per ton could be made from the ore of lodes Nos. 2 and 3. Expects to ship ore to Lake Milling, Smelting & Refining Co.'s plant in 1914, but plans building a stamp mill, down the hill, less than a mile from No. 2 shaft, a half-mile back from the lake front, to provide sand room. This mill is expected to give the company a transportation cost of about 4 to 5 cts. per ton on rock stamped.

The mine has been developed very extensively and given a thoroughly modern and complete equipment. The ground opened, while by no means as rich as some in the Lake Superior district, is of fair average value and with extensive openings, an exceptionally good equipment and an able and experienced management, the Hancock promises to make a successful low-grade mine.

HANCOCK COPPER MINES CO. OF IDAHO, LTD.

IDAHO

Idle. John Sennett, sec.-treas., No. 79 Milk St., Boston, Mass. Mine office: Landore, Washington Co., Idaho. Col. C. F. Drake, pres. and gen. mgr.; W. M. Palmer, vice-pres.; preceding officers, M. C. Drake and Dr. J. E. Stevens, directors, at last accounts. Organized 1905, under laws of Idaho, capitalization \$1,000,000, shares \$1 par, nonassessable.

Property is in the Seven Devils camp, comprising 16 claims, area 320 acres, on Camp creek, 2 miles from Landore. Mine has a 75' shaft on the Humboldt claim and a 380' tunnel, with a number of other shallow shafts and short tunnels, and is said to have a contact deposit 75' wide, carrying 50' of ore averaging 20% copper. Equipment includes a Huntington mill, amalgamating plates and Wilfley tables, turning out concentrates said to average \$150 per ton in value. The company also has 6 gold claims, at Rankin, Idaho, having a 200' tunnel, which was being worked, late 1910, with the copper claims idle.

HANEY COPPER CO.

ARIZONA

Address: care Ev. Haney, Prescott, Ariz. Company owns properties at Ramsgate, 12 miles west of Prescott. Began development June, 1913.

HANNA MINING & MILLING CO.

COLORADO

Mine office: Capitol City, Hinsdale Co., Colo. G. H. Martin, supt., 1913. Has auriferous and argentiferous copper and lead ores, with steam and electric power and a 100-ton concentrator. No returns secured.

HANOVER COPPER CO.

NEW MEXICO

Idle. Letter unclaimed at Duluth, Minn. Mine at Hanover, Grant Co., N. M. Geo. A. St. Clair, pres.; J. S. Dickie, gen. mgr.; preceding offi-

cers, Wm. Elder, M. E. Riley and Arthur Howell, directors. Organized 1909, capitalization \$50,000, shares \$10 par. Property 15 claims, north of the Chino Copper property and near the holdings of the Philadelphia Copper Co. Mine has shafts of 70', 100' and 150', and tunnels of 40' and 60', showing ing copper ore.

HAPPY JACK MINING & REDUCTION CO.

ARIZONA

Office: 530 Land Title Bldg., Philadelphia, Pa. Mine office: Patagonia, Santa Cruz Co., Ariz. Alfred W. Barnett, pres. and gen. mgr.; W. H. Barnett, vice-pres.; Henry W. Scattergood, sec.-treas.; preceding officers, Martin Stotz and Theo. Myers, directors. Organized Oct., 1908, as successor of Happy Jack Mining Co., under laws of Arizona, capitalization \$1,000,000, shares \$1 par, fully paid and nonassessable; issued, 304,709. shares. Property 9 miles from Patagonia, has a shallow shaft and a 950' tunnel planned to be driven 2,700', showing lead and copper ores. Is said to have shipped considerable ore of good average tenor in the past and is considered promising. Assessment work only done under present ownership.

HAPPY JOHN MINE.

BRITISH COLUMBIA

Probably closed down. Mine at Alberni, Vancouver Island, B. C. A. J. Envik and Frank Bros., owners. Lands, 4 claims, 125 acres, west of the Monitor mine on the western side of the Alberni canal, having a 175' tunnel, showing a vein with paystreak of 30" extreme width, assaying 12% copper, 1.7 oz. silver and \$1.20 gold per ton.

HARCÚVAR COPPER CO.

ARIZONA

Office: 1201 Pennsylvania Bldg., Philadelphia, Pa. Mine office: Wenden, Yuma Co., Ariz. Lemuel B. Woolston, pres.; Hon. Dennis A. Burke, vice-pres.; N. A. Lund, sec.-treas.; R. R. MacDonald, supt.; Herbert C. Shotwell, engr., at last accounts. Organized May, 1907, under laws of Arizona, capitalization \$2,000,000, shares \$1 par, nonassessable; 1,400,000 shares issued. Security Transfer & Registrar Co., New York, transfer agent and registrar. Stock listed on the New York curb. Annual meeting, first Monday in May.

Lands 9 claims, patented, 180 acres and a 20-acre water right, adjoining the Oro Cobre, about 12 miles northwest of Wendendale, in the Cunningham Pass district of the Harcúvar mountains. Property has several contact deposits, between gneiss and diorite, of which 1 of 40 to 60' estimated width, traceable for some distance, is said to show oxidized ores and considerable chalcocite in surface workings, with chalcopyrite at depth. Development said to include a 511' drift tunnel, showing ore reported to average about 3.5% copper, 1.5 oz. silver and \$6 to \$8 gold per ton. Has a poor reputation locally. Equipment includes gasoline power and 3 small buildings. Property a mere prospect without any merit and stock practically worthless. Is a Philadelphia "wild cat." Company was promoted by Sutro & Co., then Gavigan & Isbel, then Gavigan & Co., all notorious and the last named put out of business by the U. S. Government. It was hoped the company had died with that firm, but stock was again offered to the gambling public in June, 1912, at 2½ cts. a share.

HARDSHELL-FLUX MINING & DEVELOPING CO.

ARIZONA

Mine at Patagonia, Santa Cruz Co., Ariz. Ben Heney, pres.; R. R. Richardson, vice-pres.; W. E. Francis, sec.-treas.; Frederick John Siebert, cons. engr.; Francis J. Heney, counsel; J. C. Hartness, gen. mgr., at last accounts. Property 30 claims, 6 to 9 miles from Patagonia, including the Flux and Hardshell mines. The Three R mine formerly owned by this company was sold in 1912 to N. L. Amster, and is described under title

"Three R Co." Ore values are mainly in silver, with some lead, copper and gold.

HARLEY GOLD MOUNTAIN MG. & SM. CO.

WASHINGTON

Idle. Letters unanswered from 704 New York Blk., Seattle, Wash., and from the mine at Darrington, Snohomish Co., Wash. Charles Burns, pres. and treas.; Harley E. Burns, vice-pres.; Henry S. Noon, sec.; K. O. Neste, gen. mgr., at last accounts. Organized Dec. 15, 1900, under laws of Washington, capitalization \$2,500,000. Lands, 16 claims, 300 acres, in the White Horse district, showing 12 orebodies, occurring as fissures in porphyry and as contact veins between granite and porphyry. Four veins under development are said to average 6' width and to carry 14.5% copper, 8 oz. silver and \$25.65 gold per ton, which claim is decidedly excessive. Development is by 4 tunnels with 346' of openings.

HARPER MINES.

TEXAS

Judge J. R. Harper, A. P. Coles and Louis W. Smith, owners, El Paso, Texas. Mine, 18 miles north of El Paso in Franklin mountains, El Paso county, shows a body of low-grade copper ore developed by shallow shafts and short tunnels.

HARRIS COPPER CO.

ARIZONA

Offices: Findlay, Ohio, and 319 Van Nuys Bldg., Los Angeles, Cal. C. C. Harris, of Findlay, Ohio, pres.; treas., gen. mgr. and purch. agt.; W. J. Martin, vice-pres.-mine supt.; Harry W. Moore, sec.; preceding officers, W. J. Sease, Los Angeles, and Fred F. Harris, San José, directors. Organized July 10, 1910, under laws of Arizona, capitalization \$1,000,000, shares \$1 par nonassessable; issued, \$710,001. Annual meeting, second Tuesday in January.

Company owns 34 claims, comprising 550 acres in the Tip Top district, Arizona. This district is about 50 miles north of Phoenix and 30 miles east of Wickenburg, on the Agua Fria river, at the mouth of Black Canyon creek. Property was partly purchased with stock and partly located by the company. It shows schists cut by diabase intrusions. The company's map shows 2 groups of claims, the Cascadilla, or western, being in part 3,000' wide, and 1,200' long; the group covers 3 veins running north and south. Development is meager, being in 1913, one 50' shaft in diabase and 2 tunnels with an aggregate of 800' of work, costing \$9,000.

The Copper Reef, or east group, is located to cover 2 veins, 1 alongside the Agua Fria river being claimed as an extension of the vein mined by the Kay Copper Co. The camp has a scanty equipment and drilling is by hand. Company claims 1,000 tons of \$15 ore blocked out, which is reasonable. One vein said to be 500' wide and another 90' in width, the observers evidently considering altered schist to be vein matter.

The president of the company writes the editor as follows: "We insist that the report speaks the truth quoted as we make the report to you and if any embellishments is placed on the wording of our report, it must conform in meaning to give the information that can be construed from the wording that we give."

The property may have a great outcrop and it may contain copper in commercial quantities, but we defy any mining engineer to find out what the company does have on its property, from the report issued by the management and reprinted as a gem of humor in the Mining & Scientific Press, and in part reproduced herewith: "COPPER.—A red, ductile, tenacious, malleable metal of great and varied use, originally called brass of cypress, copper sand, alacaunte, C group of minerals, mostly soft, included C, cuprite, malaconite, malachite, malconite, chessylite, chrycopyrite, oliv-

nite, etc. Black C ore, malaconite, gray C ore, Chalcocite, C Purite, yellow C ore, variety Chalcopyrite, the common ore.

"The formation of the Harris Copper Co. have blended with the iron, lime and porphyry with quartz. Many of the above minerals, but more especially the commoner forms with oxides condensed formation on the top with the iron and lime, with a great amount of carbon and sulphur in the schist formation, with an amalgamated condition of the various mineralizations where gold and silver predominates. The schist formation being soft, it stands to reason that when the sulphides appear in the lower rocks, I am led to believe from the geological lay of the uplift that is now held and owned by the Harris Copper Co., there is beneath the surface of this great iron capped ledge a great body of copper ore." Enough said.

Despite the unfavorable impression created by the company's literature, it is understood that the property has genuine merit, has large orebodies and with cheaper transportation will make a good mine.

HARRIS COPPER CO.

MEXICO

Idle. Address: care Fritz Werner, agt., Central Bldg., Los Angeles, Cal. Mine office: Nacozari, Moctezuma, Sonora, Mex. Organized about 1908. Lands, 346 hectares, 3 miles east of the Pilares mine of the Moctezuma Copper Co., including La Caridad group, supposed to have been bought for \$40,000, said to have 6,000 tons of ore blocked out averaging 4 to 6% copper. Mine shipped 3 carloads of 25% copper ore in 1909.

Property known as Caridad mine, is situated about 18 miles east of Nacozari and 10 miles from the Bavispe river. Claims show N. W. and S. E. shear zones in quartz porphyry, carrying pyrite in silicified rock. Where crossed by intersecting fissures there are "pipes" of brecciated rock cemented by tennantite (sulpharsenite of copper with 57.5% copper) and chalcopyrite with pyrite. The claims cover precipitous bluffs and pillars of rock, showing porphyry overlaid by coarse, iron-stained breccia (agglomerate). The porphyry shows abundant and widespread traces of mineralization throughout a zone about 2,000x3,000', containing several small "pipe" orebodies of high-grade ore.

Development is by tunnels, there being 5 on the Caridad claim, totaling 800', and there are a few shallow shafts. Diamond drilling has shown that the orebody extends downward but does not increase in size. Property interesting, but not considered attractive as a large mining proposition.

HARTFORD-ARIZONA COPPER MINING CO.

ARIZONA

Address: Hamburg, Cochise Co., Ariz. Henry Hamburg, pres. and mgr. In Sept., 1913, the Arizona Corporation Commission authorized the company to incur a \$100,000, 6% bond issue, for further mine development. Owns the Wisconsin group in the Huachuca mountains. Company has surveyed a line for tramway to wagon road and will ship to Hereford or to a point on Fort Huachuca branch of the El Paso & S. W. R. R. Property developed by tunnels, has steam plant and compressor and employed 30 men at last accounts.

HARTWIG MINING CO.

IDAHO

Idle. Address: care George Hartwig, gen. mgr., at Aurora, Ore. Mine at Pollock, Idaho Co., Idaho. W. J. Moore, pres.; G. W. G. Geiger, sec.; Samuel Block, treas.; preceding officers, Wm. Hartwig, Fred Goldsmith and Gustave Peters, directors. Organized Jan. 3, 1906, under laws of Iowa, capitalization \$900,000, shares \$25 par; fully issued.

Lands, 5 claims, patented, 72 acres, and a 5-acre mill site, in the Rapid River district, near Salmon river, carrying several contact deposits between limestone and diorite, of which 4, under development, are of 30' estimated

average width, traceable 400', carrying oxidized and chalcopyrite ores, estimated by company to average 14% copper, with traces of lead and zinc, 3 oz. silver and \$10 gold per ton. Figures undoubtedly too high for an average of the orebody. Mine has a 75' shaft, and 3 tunnels of 1,000' aggregate length, an 875' lower tunnel cutting the ore zone, which shows but little ore. Property has 4 buildings but no power equipment. Idle some years, owing to lack of transportation facilities.

HAUXHURST MINE.

ARIZONA

Idle. Letter unclaimed at mine. Address: Agua Caliente, Maricopa Co., Ariz. Jas. Hauxhurst, owner and mgr., at last accounts. Lands, 900 acres, in the Big Horn mountains, about 65 miles west of Phoenix and 27 miles southwest of Wickenburg, the nearest rail station. Mine, formerly owned by the Hauxhurst Copper Co., was under bond for about 3 years to the United States Copper Mines, Inc., which forfeited same, 1909. Mine has about 25 pits and shafts of 14 to 400' depth, and was claimed to have a 9' vein carrying a 15" paystreak assaying 25% copper, 3 oz. silver and \$25 gold per ton, which figures unquestionably represent only the ore of a narrow and short payshoot in the vein, and cannot be taken as average values.

HAVALINA MINING CO.

ARIZONA

Address: Duquesne, Ariz. Sold its Santa Nino property, Patagonia mountains, southwest of Duquesne, Santa Cruz county, Ariz., to J. Wells Smith, Feb., 1913. Property being developed, 1913, by 800' crosscut tunnel to reach a rich copper shoot said to have been found in 1912.

HAYCOCK MINE.

PENNSYLVANIA

Idle. Address: Charmian, Franklin Co., Pa. Owned by C. E. Wills. Property shows copper-stained rock and some ore on the northern slope of Haycock mountains.

HAYES & GRACEY SYNDICATE.

ARIZONA

M. P. Hayes and T. H. Gracey, Los Angeles, Cal., owners. Succeeds the Dragoon Copper Mining & Smelting Co., now dead. Geo. M. Henry, superintendent, Pearce, Cochise Co., Ariz. Property consists of the Christmas and Eureka claims carrying replacement deposits with silver-lead-copper ores. Development is by a shaft 550' deep. Equipment includes steam power and air compressor.

HAYES MINE.

PENNSYLVANIA

Idle. Address: Charmian, Franklin Co., Pa. Is a copper prospect on Greenstone Islet in Cambrian sandstone of Snowy mountain. Shows native copper and cuprite with epidote in amygdaloidal greenstone. Mine has no deep development.

HAYNES COPPER CO.

ARIZONA

Office: care C. B. Stranahan, pres., 82 Beaver St., New York. Mine near Jerome, Yavapai Co., Ariz. A. F. Pritz, vice-pres.; G. E. Dorwart, sec.; preceding officers, C. H. Harris and L. E. McBride, directors; Thos. E. Campbell, mine supt.; W. V. DeCamp, asst. supt. Organized Oct., 1906, under laws of Arizona, as successor of Jerome Mines Development Co., capitalization \$2,000,000, shares \$1 par; issued, \$1,200,000. Annual meeting, first Monday in August.

Property, 161 acres, northwest of the United Verde, shows lenticular orebodies in dioritic schist, traceable 2,000' and from 3 to 19' wide. Under old management extensive diamond drilling was followed by sinking a 2½ compartment shaft 700' deep with 2,000' of drifting and crosscutting. Property also has 248' tunnel and 40', 45' and 350' prospect shafts. Property was closed down Dec., 1910.

Mine was reopened Dec., 1912, under new management selected by principal stockholders. The shaft was unwatered and Oct., 1913, was 1,000'

deep and sinking at rate of 70' a month to 1,200' level, where crosscutting northeast and southwest will be done to reach the mineralized zone cut on 700' level and the Major faults.

Ground is wet, but water is handled by Gould triplex pump on 700' level. Equipment includes 350-h. p. steam plant, a double-drum hoist good for 2,000' and a 6-drill Ingersoll-Rand air compressor. Uses electricity furnished by Arizona Power Co. for all purposes.

Method of continually selling treasury stock is open to criticism, but present management appears to be spending the company funds in real development work.

HAZEL MINING CO.

TEXAS

Chas. Cutler, Dallas, Tex., mgr. and chief owner; W. H. Case, supt. Property in Diablo mountains, 15 miles northeast of Van Horn, Culbertson Co., Texas, consists of the Hazel Silver mine, showing a fissure vein that yields chalcocite ore with barite gangue, shipping ore averaging 10% copper and 50 oz. silver per ton. Development includes 700' shaft and extensive workings at various levels. Mine was worked for 10 years by H. G. Clifford of El Paso and A. C. Schriver of San Antonio, producing \$500,000, but was shut down in 1895. Recently a new dry concentrator has been erected to treat the old dumps, said to contain about 100,000 tons of \$15 copper-silver ore.

HEAD LAKE GOLD-COPPER MINING CO.

WASHINGTON

Address: care George Geisler, pres., Spokane, Wash.; J. A. Sullivan, A. M. Harris, vice-presidents; W. E. Allen, sec.-treas.; directors. Property comprises 22 claims, about 500 acres, in the Newport mining district, near Metaline, Pend Oreille Co., Wash. Company recently acquired the Comstock and Key Fraction group, containing silver and lead-bearing ore. Shipments expected in autumn of 1913.

HEADLIGHT GOLD & COPPER MINING CO.

CALIFORNIA

Probably closed down. Secretary, C. R. Wisehart, 2115 South Union Ave., Los Angeles, Cal. Organized 1906, under laws of Arizona, capitalization \$1,000,000. Lands, about 6 miles west of Needles, are slightly developed by a shaft. Property not regarded as promising.

HEADLIGHT MINE.

PENNSYLVANIA

Idle. Mine near Charmian, Pa. Has a 160' tunnel in quartzose greenstone impregnated with native copper with an ore shoot 60' from mouth, showing 5' of 10 to 20% copper.

HEARNE GOLD & COPPER CO.

COLORADO

Idle. Office: Wheeling, W. Va. Mine office: Central City, Gilpin Co., Colo. W. H. Hearne, mgr.; Mathew Daniels, supt. Organized 1907, under laws of Colorado, capitalization \$500,000. Property is the Anchor mine, in Willis gulch, drained by the Newhouse tunnel, showing considerable bodies of low-grade copper and lead ores and medium-grade silver ores. Electric power used; has air compressor, and a 50-ton 10-stamp mill and concentrating machinery.

HEBER SPRINGS COPPER MINING CO.

ARKANSAS

Office and mine: Heber, Cleburne Co., Ark. Organized about 1910, to develop lands in the vicinity of Heber. No trace of operations secured. Regarded unfavorably.

HECKLEY GOLD & COPPER MINING CO.

ARIZONA

Succeeded by Mars Consolidated Copper Co., Dec., 1912, and described under that title.

HECLA (CONSOLIDATED) MINE.

MONTANA

Office and mine: Glendale, Beaverhead Co., Mont. Henry Knippenberg, owner. The property was worked by leasers, in a small way, until

1912, when it was taken over by the Longmaid Bros. of Helena, who have installed electric power and will reopen and work the property on a large scale. Property is the Atlantis, Cleves and other mines, formerly owned by the Hecla Consolidated Mining Co., which for 20 years was a large producer of silver and lead, with considerable gold and copper, latter reaching 100,000 lbs. fine copper yearly. Property paid dividends of \$2,-250,000 on an original investment of \$40,000, but was bought, 1906, at sheriff's sale, for \$28,000.

HECLA CONSOLIDATED MINES CO.

WYOMING

Idle. Office: 1624 Curtis St., Denver, Colo. Mine office: Hecla, Laramie Co., Wyo. Henry Schwartz, pres.; Wm. L. Wilson, vice-pres.; Lawrence Myers, sec.; Eli Miller, treas., and Henry Hirsch, directors. Organized 1909, under laws of Wyoming, capitalization \$5,000,000, shares \$1 par, as a merger of the Hecla Mining Co., Amalgamated Copper Mining & Extraction Co. and Kopper Krown Mining Co.

Lands, 610 acres, including the Hecla group, 13 claims, 2 patented, and a 35-acre town site, is in the Silver Crown district, 4 miles from Granite Canyon, on the Union Pacific railroad and 7 miles from the Cheyenne Northern line. The Hecla is claimed to show 16 fissure veins, of 8' average width, in schist and granite, of which 3, of 7" average claimed width, carry oxidized and sulphide ores, said to give average assays of 3.4% copper, 3 oz. silver and several dollars in gold per ton, besides nickel, platinum and uranium. Development includes a 40' tunnel and 14 pits and shafts of 10 to 140' depth. The Hecla group made an ore shipment, previous to Sept., 1909, to the Boston & Colorado smelter.

The Teddy Roosevelt-Good Hope group, formerly held by the Amalgamated Copper Mining & Extraction Co., comprises 10 claims in the Silver Crown district, 2 miles from the Union Pacific railway and 23 miles from Cheyenne, with about 700' of workings, claimed to show ore giving fair assays in copper.

The Kopper Krown group, about 2 miles southwest of Hecla and 22 miles west of Cheyenne, 7 claims, 140 acres and not 154 acres as claimed by the company, has 413' of workings, claimed to show 10,000 tons of sulphide ore blocked out for stoping.

The Hecla mill, 80x100' in size, has 15 stamps, a 50-ton concentrating plant and a leaching plant. The Ohly process, installed in an attempt to save the rare metals, was not a success. Ore, mainly low in grade, is only in part adapted to concentration, and the mill requires overhauling and adaptation to the ore. With concentration by the Minerals Separation process, on the sulphide ores, property ought to be workable. The history and financial methods of this company and its predecessor are described in Vol. X. Idle, except for annual assessment work, but presumably still has stock for sale.

HECLA COPPER-SILVER MINING & MILLING CO. WASHINGTON

John C. Argall, Spokane, Wash., purch. agt. Mine address: Chewelah, Wash. J. C. Argall, Howard McPhee, Cheney, Wash. and Virgil R. Hoar, W. G. Hoar, John Frederick, Charles Linscott and A. W. Snellgrove, all of Spokane, directors. Property consists of 6 claims located 3½ miles northeast of Chewelah and south of the United Copper Co. holdings. The claims show 4 ledges, the main vein varying from 6 to 14' wide, traceable by cuts and pits for nearly a mile and averaging 5.4% copper, \$1 in gold and \$1.80 in silver. Work planned includes a tunnel with drift on the vein and the erection of power line and necessary buildings. About 70 tons of high-grade ore are on the dump.

HECLA-GRANITE MINING CO.**COLORADO**

Idle. Mine near Turret, Chaffee Co., Colo. Company is an offshoot of the Stratton Gold & Copper Mining Co. that took over the Stratton group. This company owns the Copperopolis group of 5 claims having a 600' shaft and showing an 8' vein of copper ore in shoots.

HEFFERN MINING & DEVELOPMENT CO.**ARIZONA**

Bankrupt, sold by sheriff. Formerly at Courtland, Cochise Co., Ariz. See Vol. X.

HELEN MINING CO.**NEW MEXICO**

Idle. Mine: Graham, Socorro Co., N. M. Thos. Graham, pres. Property comprises the Confidence, Last Chance and Black Bird mines on an E.-W. quartz vein whose ores carry gold, silver and copper. Mine, 1,030' deep, the deepest in the district, has a 30-stamp mill, with steam, water and electric power. Idle since 1902.

HELENA-BUTTE MINING CO.**MONTANA**

Idle and probably dead. Mine near Clancey, Jefferson Co., Mont. Frederic E. J. Lloyd, pres.; Chas. J. Burgess, sec., when operating. Organized under laws of Montana. Owns the Silver Crest mine in Warm Spring gulch, 6 miles from Clancey; has a 200' three-compartment shaft, showing silver-lead ore, with some copper and gold values, with hopes of increasing copper at depth. There is a fair power equipment, and several small mine buildings.

HELGA GOLD & COPPER CO.**BRITISH COLUMBIA**

Probably dead. Letter unclaimed at mine address: Clayoquot, Vancouver Island, B. C. B. F. McCurdy, supt., at last accounts. Lands, 5 claims, 250 acres, known as the Good Hope group, on Trout river, developed by a tunnel said to give a fair showing of ore.

HELLAN MINING CO.**WASHINGTON**

Probably idle. Mine 15 miles northeast of Cle Elum, in Liberty, or Swauk district, Kittitas Co., Wash. Property carries quartz veins in Tertiary sandstone alongside basalt dikes with copper and free-milling gold veins, development being mainly on latter. Equipment includes a 10-stamp mill and 40-ton concentrator, built 1908.

HELVETIA COPPER CO.**ARIZONA**

Idle. Office: 907 Metropolitan Life Bldg., Minneapolis, Minn. Mine and works office: Helvetia, Pima Co., Ariz. C. C. Prindle, pres.; Chas. W. Sexton, vice-pres. and sec.; Robert H. Gross, treas.; preceding officers, William A. Paine, Jas. H. Seager, John S. Pillsbury, Russell M. Bennett and John R. Van Derlip, directors; W. C. Steubing, cons. engr. Organized March 3, 1899, under laws of New Jersey, and reorganized Oct. 4, 1905, under laws of Arizona, capitalization \$5,000,000, shares \$25 par, in \$250,000 full-paid and \$4,750,000 assessable stock; fully issued. Levied 50-ct. assessments, payable July 20, 1908; April, 1909; February, 1910, and Feb. 15, 1911, the latter assessment rendering the stock \$15 paid. State Street Trust Co., Boston, registrar; Boston Safe Deposit & Trust Co., transfer agent. Annual meeting, first Monday after first Tuesday in October.

Financial statement of Dec. 31, 1912, is as follows: Capital stock, \$3,100,000; interest, \$5,626; expenditures to date for mining property, \$2,181,786; for development, \$777,915; for equipment, \$47,940; treasurer's account, \$41,545; unpaid assessments, \$35,605; cash in bank Tucson, \$498; ore in stock pile, \$11,000; accounts receivable, \$27; general expense, \$9,306. There is no bonded indebtedness and all accounts are paid.

The company's holdings are at Helvetia, at the west foot of the Santa Rita mountains, 18 miles north of Vail, on the Southern Pacific, and El Paso & Southwestern railroad.

Lands, 55 claims, 38 patented, area 853 acres, also a 40-acre patented mill and smelter site, and 960 acres of scrip land, giving total holdings of 1,853 acres, 30 miles southeast of Tucson. The formations resembling those of Bisbee, include Carboniferous and older limestones lying north of a great granite mass with porphyritic intrusions. The limestone has many iron outcrops underlain by orebodies occurring as replacements. These have an average strike of N. 35° W., with average dip of 45°, carrying ore of 2 to 4% copper.

There are 5 known orebodies called the Isle Royale, Old Dick, Exchange, Pilot and Heavy Weight, with development under way on 3.

The Isle Royale mine, idle several years, has an 800' shaft, with a 196' winze, and shows lenses of 3 to 5' average and 15' maximum width, carrying ore averaging about 3% copper and \$1 per ton in combined gold and silver values. The lower levels show sulphide ore, and this shaft furnishes sufficient water for mine and smelter use.

The Old Dick mine carries an orebody estimated at 1,500' in length, of 20 to 50' width extending only to the underlying granite, at depth of 110 to 150' and now largely worked out. The 127' shaft has 1 level, showing sulphide ore of good average tenor. There is also a tunnel leading to an open pit showing a vein of about 7' width said to average better than 5% copper. The Heavy Weight vein of about 7' width, 7' from and nearly parallel with the Old Dick vein, carries sulphide ore of 3 to 5% copper tenor at shallow depth, and shows a considerable amount of low-grade concentrating ore. There is also considerable concentrating ore in the Old Dick mine, and much 2% ore in the Elgin mine.

The Leader mine, opened by tunnel and drift under 700' of heavy iron gossan, is estimated to show 10,000 tons of 3% ore. Work on the Leader and Elgin mines was suspended Aug. 1, 1910.

The Copper World mine, to which operations were confined before closing down in 1912, is the principal producer of recent years, showing a vein of 15' estimated average width, traceable about 3,000', carrying oxidized ores above and sulphides below, with values, mainly in the latter, formerly estimated by company to average 5% copper, 0.5 oz. silver and 50 cts. gold per ton, which figures probably were too high. The Copper World mine has a 480' shaft sunk at an angle of 64°, with first level at 135' from surface and 3 levels below at 100' intervals. This mine has about 15,000' of workings, exposing an oreshoot about 500' long, and up to 40' in width, ranging 2 to 8% copper tenor and proven depth of about 80'. In other portions of the mine 3 shoots of ore have been opened, 1 of 35 to 60' width, maintaining an average of about 4% copper. The 2 other shoots are 6' and 12' wide, where opened, but apparently wider at depth and carry ore ranging 2 to 3% in copper tenor. The 100', 200' and 300' levels of the Copper World show a large tonnage of low-grade ore, with considerable ore of medium grade and some high-grade ore. A heavy flow of water on the 400' level hampered operations and necessitated bulkheading until the installation of a Prescott triplex pump, with capacity of 700 gals. per minute, working against a 500' head. The cost of hauling this ore to the railroad proved too expensive to permit operating at a profit and the amount of ore developed does not warrant building a railway, so the mine is closed down and the company must either wait until a railroad is built or levy an assessment on the shareholders for that purpose.

The mine as a whole has several miles of laterals, estimated to show about 400,000 tons of ore.

Equipment includes a 375-h. p. steam plant and a 50-h. p. gasoline

hoist, good for depth of 600', a 9-drill Ingersoll-Sergeant air compressor and an electric-light plant.

There are 35 buildings, including a machine shop, smithy, carpenter shop, power house and dwellings. Fuel used was petroleum, with yearly consumption of about 8,500 bbls.

A railway line has been surveyed from Helvetia to Vail to connect, at the latter point, with the Southern Pacific, and there is telephone connection with Vail.

The company has a 100-ton water-jacket blast furnace, and a 30-ton Medbery rotary oil-burning furnace, treating 2-ton charges at frequent intervals, was installed by the inventors, at their own expense, under a guarantee to treat ore at half the cost of ordinary water-jacket blast furnaces burning coke, but proved a dismal failure.

HEMBRILLO COPPER MINING CO.

NEW MEXICO

Letter unclaimed at former office: El Paso, Texas. Mine address: Tularosa, but mine is in Socorro Co., N. M. J. W. Eubanks, county surveyor, El Paso, Texas, pres.; W. M. Fly, Gonzalez, Texas, vice-pres.; H. C. Marks, sec.-treas.; John P. O'Connor, gen. mgr. Organized 1904. Property, 12 claims, in Hembrillo canyon, on the eastern side of the San Andreas mountains, 35 miles west of Tularosa, with a wagon road thereto, said to carry 3 strong veins with N.-S. strike converging to the south. The central or main vein is but a few inches wide at the surface but widens to 6' in the shaft. Vein lies between quartz-porphry and limestone and is said to have a nearly vertical dip. Recent development is by the Platte crosscut tunnel 961' long, in Sept., 1913, which has cost \$20,000 and has just cut the vein 500' below the outcrop. Before starting this tunnel company sank numerous pits showing copper ore, and a 150' vertical shaft in which the vein is seen to carry oxide and carbonate ores that average 12% copper and has a little chalcopryite in the lower workings. The heavy flow of water led to the abandonment of this shaft

HEMPLE COPPER MINING CO.

ALASKA

Office: Valdez, Alaska. Mine office: Landlock, Alaska. S. A. Hemple, pres., treas. and gen. mgr.; F. S. Sylvester, vice-pres.; S. I. Hemple, sec.; preceding officers, Arthur Lang and R. P. Ferguson, directors; Frank Stone, supt. Organized March, 1910, under laws of Alaska, capitalization \$1,000,000, shares \$1 par, nonassessable. Company is said to have expended considerably over \$25,000 on the property.

Lands, 6 patented claims, 120 acres, with a 2-acre mill site, all timbered, near the Standard and Three Man mines, at Landlock bay. Property shows greenstone, slate and quartzite, carrying 2 veins having 5 or 6 shoots, said to average 24' in width and to be traceable 2,000', carrying chalcopryite giving average assays of 3 to 8% copper. Mine is opened by tunnels of 50', 300' and 575', with about 2,000' of workings, estimated by management to show about 200,000 tons of ore blocked out for stoping, which estimate seems high. There is no power plant, but property has 6 buildings. Was under option, May, 1913, to a Portland, Ore., syndicate.

HENDRICKSON MINE.

UTAH

Mine near Newhouse, Utah. Leased, 1912, by J. C. Nelson and J. M. McPhee, who shipped copper-lead ores in that year.

HENLEY CONSOLIDATED COPPER MINES.

WYOMING

Henry Schwartz, Denver, Colo., chief owner; H. W. Honacker, vice-pres. Property, 3 claims, 60 acres, 25 miles southwest of Cheyenne, Laramie Co., Wyoming. Developed for 15 years past. Mine has 2 orebodies. Property reported sold to a \$10,000,000 English-French syndicate in Sept., 1913, for \$5,000,000, which may or may not be true. Syndicate is said to

be interested in general irrigation, mining and oil schemes, to exploit properties in Colorado and southern Wyoming.

HENRIETTA MINING & MILLING CO.

COLORADO

Mine office: Silverton, San Juan Co., Colo. Organized 1909, to acquire the property of the San Juan Smelting & Refining Co., sold at sheriff's sale. Company has suffered from a complication of bad luck and bad financial conditions and has been in a comatose condition for 2 years past. The former president, E. C. Drews, is said to be in the penitentiary but whether for his connection with the company or not is not known. Company and the mining and smelting property owned by it are described Vol. X.

HERCULES MINING CO.

BRITISH COLUMBIA

Idle. Mine office: Jedway, Queen Charlotte island, B. C. Claims are near the Ikeda mine, on Moresby island. Apparently has little or no development.

HERMINA MINING CO.

ONTARIO

Office: 109 5th St., Calumet, Mich. Mine office: Massey, Ontario, Canada. Edw. J. Hall, pres.; Christ Schenk, vice-pres.; Lucas Hermann, sec.; W. B. Anderson, treas.; preceding officers, Ole Olson, A. T. Laberge, W. O. Olson, J. S. Pickell and T. H. Pollack, directors.

Organized June, 1903, under laws of Ontario, capitalization \$2,500,000, shares \$12.50 par; \$8 paid and \$4.50 assessable. Total assessments to date, \$2.35 per share; 75,000 shares issued. Annual meeting, fourth Tuesday in June. Owns a number of mining claims near Massey, Ont., on which shafts were sunk and ore developed. In 1910 company extracted small quantities of copper but has been idle since then.

HERMOSA COPPER CO.

NEW MEXICO

Office: 30 Church St., New York. Mine office: Hanover, Grant Co., N. M. John B. Keating, pres.; L. B. Judson, vice-pres.; M. F. Westover, sec.; Henry N. Darling, treas.; A. W. Burchard, D. M. Riordan, T. Beson and John R. Turner, directors. Organized July 20, 1905, under laws of New Jersey, capitalization \$100,000, shares \$100 par. Corporation Trust Co., New York, registrar. Annual meeting, first Monday in June.

The mines, discovered 1800, and opened 1880, were worked intermittently, owing to various Indian troubles and lack of funds, until taken over, 1904, by the present owner, which practically is the General Electric Co.

Lands, 114 claims, patented, about 2,200 acres, in the Central or Hanover district, adjoin the Chino Copper Co., and include the Ivanhoe and Humboldt mines, also the Copper Queen, Treasure Vault, Wild Cat, Ninety, Tourmaline and other mines and attempts at mines. Country rocks are porphyry, granite, quartzite and limestone, showing various contact deposits between granite and limestone, with porphyry intrusions, ores occurring as lenticular bodies, in veins with a generally northeasterly and southwesterly strike and an average dip of 45°. Four different orebodies are being developed, these ranging 15 to 20' in width, with a known depth of 410' and known length of 2,000'.

Development is by shafts, as follows: Ivanhoe, 350'; Ninety, 410'; Treasure Vault, 325'; Wild Cat, 410'; Humboldt, 300'; Copper Queen, 200'; Tourmaline, 300'; Mabel, 200'. All shafts show ore and the various mines have about 3 miles of workings, estimated to show 100,000 tons of ore, with 25,000 tons blocked out for stoping. The property has large bodies of low-grade concentrating ore carrying average values of 3% copper, 3 oz. silver, and slightly under \$1 gold per ton, with small quantities of lead near the surface and occasional traces of zinc, but not in sufficient quantities to materially hamper reduction.

Equipment includes a 700-h. p. steam plant, with 7 hoists, good for 500 to 1,000' each, and 4 Sullivan air compressors of 26 drills aggregate capacity. Buildings include a machine shop, smithy, carpenter shop, framing mill, warehouse and sawmill, with a total of 20 buildings.

The 40x90' concentrator, of 100 tons rated daily capacity, built by a former management, was altered and used for experimental purposes and has a No. 14 Blake crusher, 2 sets of rolls, 1 Hartz jig, 5 Overstrom tables, 2 Wilfley tables, 7 screw sizers, 1 hydraulic sizer and 1 Huntington mill.

Considerable systematic development was done, 1904-07, based upon estimates of tonnage by eminent engineers, but results did not come up to expectations, for although some fairly large bodies of low-grade ore were found, they were not large enough to render the property profitable. Further work, in the way of systematic drilling, which has developed large orebodies in the Chino, is under consideration. Property closed down and in hands of a caretaker at present.

HERMOSILLO COPPER CO.

MEXICO

Office: Columbus Savings & Trust Bldg., Columbus, Ohio. Operating office: Aptdo. 98, Hermosillo, Sonora, Mex. Mine and works are near Hermosillo, Sonora, Mex. J. L. Zimmerman, pres.; C. P. West, vice-pres.; R. D. Wood, sec.-treas.; preceding officers, A. J. Rusling, F. E. Resler, L. A. Clark and Dr. H. W. Whitaker, directors; Jas. Penman, gen. mgr. Organized Feb. 13, 1909, under laws of Mexico, as Hermosillo Copper Co., S. A., capitalization \$1,500,000, shares \$1 par, nonassessable; issued, \$1,000,000. Company was practically a reorganization, under the same management, of the Verde Grande Copper Co., whose property was bought, Jan. 13, 1909, at public sale and old shareholders were given a chance to get new stock, share for share, plus 25 cts. cash per share.

Property, about 1,300 acres, with 200 acres of mill and smelter sites, in the Hermosillo district, about 28 miles northwest of Hermosillo, consists of 9 claims, the El Porvenir, El Picacho, Teodore, El Bajio, Hermosillo, Verde Grande, La Verde, La Cobriza and San Luis groups, reported by the management to carry porphyry and lime cut by granite. The Picacho and Verde Grande have contact deposits in limestone, near igneous intrusives, carrying oxidized ore giving assays of 6% copper, 8 oz. silver and \$1 gold per ton. La Cobriza group and La Verde have contact deposits between granite and quartzite, of 30 to 60' claimed width, traceable 7,000', carrying auriferous and argentiferous copper ore said to assay 5.5 to 20% copper, with gangue of talcose limestone. Company reports 7 orebodies under development of 10 to 100' width, averaging 5.44% copper, 8.66 oz. silver and 75 cts. gold per ton.

Development consists of 20 shafts and tunnels with over 7,000' of workings, reported to show over 200,000 tons of ore.

Equipment consists of a 100-ton Allis-Chalmers blast furnace, a 30-h. p. hoist, 6-drill Ingersoll air compressor, etc. Smelter is 1½ miles from principal workings.

Owing to the Mexican revolution, work for past year has been mainly diamond drilling. Small shipments said to carry 20% copper, 30 oz. silver and \$1.25 gold per ton, were made. Company expects to operate smelter and vigorously develop mine when peace is restored.

HICKOK MINE.

NEW MEXICO

Emory Hickok, owner, Engle, Sierra Co., N. M. Property, 15 claims, south of the Elephant Butte dam. The Hillsboro, Copper Queen and Black Swan claims are reported to show a contact deposit between limestone and granite that dips east and carries 18" of copper and malachite ore.

HIDALGO COPPER MINING & SMELTING CO.**MEXICO**

Office: Avenida 16 de Septiembre No. 26, Mexico, D. F. Mine and works office: Zimapan, Hidalgo, Mex. Sydney Ludlow, pres.; Ricardo T. Sobey, vice-pres.; R. A. Mills, sec.; Hedley Ludlow, treas.; preceding officers, George A. Camphuys and W. H. Armstrong, directors; Hedley Ludlow, gen. mgr.; Jas. H. Armstrong, supt.; Plenio Lopez, engr.; Halarion Diaz, chemist. Organized Aug. 14, 1907, under laws of Arizona, capitalization \$2,000,000, shares \$10 par, in \$1,000,000 preferred and \$1,000,000 common stock. Annual meeting, third Monday in August.

Lands, 44 properties, 500 acres, with a 500-acre mill site. About half of the properties, including the Concordia and Purisima mines, produce mainly copper ores, but carry small amounts of lead ore. Lands show monzonite-porphry and limestone, with contact orebodies, 1 with strike due east and 80° dip, 1 with strike N. 60° E. and dip of 80°, and 1 with strike N. 30° W. and dip of 65°. Two orebodies are under development, 1 to 4 meters average width and 115 meters proven length. There is also said to be a 20' vein, carrying ore worth 45 pesos per metric ton, with values about equally divided between silver and copper. Copper ores are estimated by the company to average 2.8% copper and 800 grams silver per ton. The mines have a great variety of ores, including copper oxides and carbonates, carbonate and sulphide ores of lead, argentite and chalcopyrite. Development is by shafts of 40, 100, 32, 71 and 60 meters depth, and by tunnels of 154, 220, 260, 175, 150, 48, 300, 97 and 38 meters length, with a total of 3,000 meters of workings, estimated to show 50,000 tons of ore, with 20,000 tons blocked out for stoping.

Equipment includes a small steam plant and 16 buildings. Company employs about 800 men at the mines and works.

The smelter, at Zimapan, 5 miles from the mine, receiving ore by pack-train, is of 50 tons daily capacity, having a 30-ton copper stack and a 20-ton lead stack, both burning coke. Copper production is 20% matte, sent to the Aguascalientes smelter. Copper production, 1909, was 5,000 long tons of ore, of about 3% copper tenor, yielding 400,000 lbs. fine copper. Lead smelter again running, 1913, after many years idleness, on ore from Nevada group of mines, averaging 25% lead and 900 grams silver. Company plans further development of Purisima, Camino and Concordia groups, and is installing oil engines and electric light, etc., at smelter.

HIDALGO PLACER MINING CO.**MEXICO**

Idle. Last address: care Josiah Smith, pres., Chester, Pa. Owns copper claims on the Rio Conchos, in the Cienegas de Olivas district, about 70 miles from Parral, Chihuahua, said to show ore assaying up to 28% copper, at depth of 100'. Property is in revolutionary zone and cannot be reached by mail.

HIDDEN CREEK COPPER CO., LTD.**BRITISH COLUMBIA**

Property bought by the Granby Consolidated Mining, Smelting & Power Co., in 1912, and company liquidated. See Vol. X.

HIDDEN TREASURE CONS. COPPER CO.**NEVADA**

Idle. Mine at Ely, Nevada. Organized, 1907.

HIDDEN TREASURE GROUP.**MONTANA**

Address: W. P. Stephens, owner, Missoula, Mont. Property near Clinton, Missoula Co., Mont., consists of 9 patented claims in the Wallace district, showing 5 veins carrying gray copper and bornite ores averaging \$2 to \$4 gold and 10 to 20 oz. silver per ton as sorted for shipments.

Development, mainly on Hidden Treasure and Cascade claims, in-

cludes 2 tunnels in a steep mountain side, uppermost 558' on vein claimed to be 50' wide. Ore cut 80' from portal and extends to face. Lower tunnel, 1,400' long, follows the east vein said to be 40' wide with local expansion to 120'. Crosscuts develop 2 other veins of 13' and 60' claimed width and drifts have opened up and show some rich spots and several hundred feet of concentrating ore. Total work 3,600'. Shipments began 1899 and ceased in 1907 and property has had but little development since, though owner expects to reopen it in 1913.

HIGGINS LEASING CO.

ARIZONA

Address: Bisbee, Cochise Co., Ariz. Property very fully described Vols. IV. and V. Is a new company, organized in 1912, to prospect the Higgins property for silver-lead and copper ores. Has no connection with company that operated same property in former years, which is described Vols. IV. and V.

HIGH TOP MINING CORPORATION.

VIRGINIA

Mine, 10 miles from Elkton, Rockingham Co., Va. Morris D. Brown, pres.; Prentice W. Brown, sec.; Frederick F. Coffin, treas., at last accounts. Organized 1909, under laws of Arizona, capitalization \$10,000,000, shares \$10 par, practically as a reconstruction of the High Top Copper Mining Co.

Lands, about 1,000 acres in Greene Co., Virginia, 7 miles from the Norfolk & Western railway, said to show ore zone 600' wide carrying sulphide ores, claimed to give average assays of 6% copper, 10 oz. silver and \$15 gold per ton, which figures are entirely too high. Mine has a 200' shaft with a 45' drift showing 8' of rock spotted with argentiferous and auriferous bornite and chalcocite, giving sample assays of 10% copper. There also is a 55' shaft and several shallow pits and open cuts, tracing the outcrop for the entire length of the property, about 3 miles. A report circulated by the company states that there are 70,000,000 tons of commercial ore discovered which is a statement worthy of Baron Munchausen. Property does show occasional spots and bunches of copper ore and a few tons of selected high-grade ore could be shipped but the mineralized rock as a whole is too lean to work at a profit. Company is believed to have no chance to succeed, its officers to be self deceived and stock is considered valueless. The property has been visited by various geologists and described in official government reports and the guarded warning given therein should be heeded.

HIGHGRADE SILVER & COPPER CO.

WASHINGTON

F. T. Hertzell, mgr., Chewelah, Stevens Co., Wash. Incorporated under laws of Washington, 1909. Property, formerly known as the Enterprise, in the eastside mineral belt 3 miles from Chewelah, shows an ore deposit along a granite-limestone contact. Development includes a 120' shaft with some crosscutting exposing a short 6" streak of high-grade silver-copper ore and some argentiferous galena with stephanite. Small shipments were made in 1913. Has a ton or so of this ore on the dump.

Equipment includes a horse whim good for prospect work only. Management not favorably considered and a 120' shaft as a result of 20 years work does not promise much to the stockholders. Property considered worthy of energetic development.

HIGHLAND BOY GOLD & COPPER MINING CO.

UTAH

Mine at Bingham Canyon, Salt Lake Co., Utah. Controlled by Utah Consolidated Mining Co., and described under that title.

HIGHLAND COPPER CO., LTD.

MONTANA

Office: 20 Riverside Ave., Spokane, Wash. R. C. McCaffery, pres.; J. A. Anderson, vice-pres.; Homer Wyld, sec.-treas.; N. J. Thomas and

J. H. Marks, directors. Organized 1909, under laws of Washington, capitalization \$1,500,000, shares \$1 par; issued, 415,200.

Lands, 5 claims, unpatented, area 130 acres, in the Silver Star district of Madison county, Mont., showing granite and limestone, carrying 5' contact deposits, with some work on each, there being 9 pits and shafts, of 45' and 80'. Main vein, estimated by company at 10' in width, shows copper carbonates at surface, with chalcocite and chalcopyrite at depth, ore having given average assays of 6% copper, 2 to 5 oz. silver and \$19.78 gold per ton. Equipment includes a 40-h. p. hoist, good for 1,000', and necessary mine buildings. Present owners expect to install gasoline engine and to sink shaft.

HIKO NEVADA MINING CO.

NEVADA

Idle. Mine at Hiko, Lincoln Co., Nev. Is said to have a 3' vein, traceable some distance, giving average assays of 4.1% copper, 6.3% lead and 46 oz. silver per ton. No returns secured.

HILLMAN COPPER CO., LTD.

ONTARIO

Idle. Letter to Sault Ste. Marie, Algoma, Ont., unanswered. T. W. Trotter, pres.; Edw. Ewing, vice-pres.; Hugh McKinnon, sec.-treas., at last accounts. Organized 1907, under laws of Ontario, capitalization \$60,000, shares \$10 par, as a holding and promotion company, with a plan of floating a larger company later. Company owns 640 acres in the township of Aweres, near the Root River mine, on the main line of the Algoma Central railway, showing veins that carry ore assaying up to 10% copper and 8 oz. silver per ton.

HILLSIDE COPPER CO.

NEVADA

Mines near Pioche, Lincoln Co., Nev. See Bristol Consolidated Mines & Smelting Co.

HINSDALE TUNNEL & REDUCTION CO.

COLORADO

Probably idle. Mine office: Lake City, Hinsdale Co., Colo. H. S. Bushnell, supt., at last accounts. Is a reorganization made in 1907 of the Henson Creek Lead Mines Co. Lands, known as the Bonanza group, include the Bonanza, Magnolia and other small mines, carrying complex auriferous and argentiferous lead and copper ores. Has water and electric power and a 50-ton concentrator.

HIRIART; AURELIO.

MEXICO

Office and mine: Charcas, Moctezuma, San Luis Potosi, Mex. Lands include the Bibiana y Anexas mines, which, 1907, produced about 15 tons of copper ore daily and the La Trinidad y Anexas mines, carrying auriferous copper ore. No information procurable, 1913, on account of revolutionary troubles in Mexico.

HOLDEN GOLD & COPPER MINING CO.

WASHINGTON

Office, Spokane, Wash. Mine near Lucerne, Chelan Co., Wash. W. J. Nicholls, pres.; A. L. White, vice-pres.; C. A. Smith, sec.-treas.; Wm. Yolen Williams, gen. mgr., and B. H. Kizer, directors.

Lands, 3 claims, area 60 acres, on Railroad creek, near Lake Chelan, 87 miles north of Wenatchee on the G. N. R. R. Claims show gneiss and schist cut by granite with a vein of 40' average and 185' claimed maximum width, developed by 6 tunnels, Nos. 2 and 3 being connected by a blind shaft with about 2,000' of workings on 3 levels. There also are numerous open cuts. Mine shows ore giving assays of 7 to 10% copper, 2 oz. silver and \$5 to \$10 gold per ton. Idle, except for annual assessment work.

HOLLOWAY MINE.

VIRGINIA

Idle. Office: care Alfred S. Wright, owner, 48 South Third St., Philadelphia, Pa. Mine office: Virgilina, Halifax Co., Va. Property, the old Holloway or Eustis mine, 3½ miles north of Virgilina, on a spur of the

Southern railway. Has a 300' shaft, equipped with steam hoist, compressor, etc., and produced ore from 75', 150', 200' and 300' levels. The vein is strong, persistent and 3 to 75' wide, owing to lenticular expansions. The ore is chalcocite in white quartz. Is described in detail by Weed in Bull. 455, U. S. Geol. Survey, p. 79. Produced 6,000 tons of 12% ore about 1902.

HOLMES LIME CO.**CALIFORNIA**

Idle. Office: Mutual Savings Bank Bldg., San Francisco, Cal. Mine at Newcastle, Placer Co., Cal. H. W. Postlethwaite, pres.; F. R. Turton, sec. Owns the Alabaster Cave mine, 180 acres, 7 miles east of Newcastle, carrying a contact deposit between limestone and slate, showing a 12 to 20' gossan. Vein carries a 3 to 8' paystreak, said to average 3 to 4% copper, with small gold and silver values. Development is by shafts of 50', 50' and 300', and tunnels of 30' and 100'.

HOLMES MINING & MILLING CO.**WISCONSIN**

Idle. Address: Mellen, Ashland Co., Wis. John Holmes, pres. and mgr.; A. D. Barnes, vice-pres.; Thos. A. Humphries, sec.; F. P. Simmons, treas.; preceding officers, Edw. Bekken, A. D. Wilson and A. D. Hill, directors. Organized Jan. 9, 1902, under laws of Wisconsin, capitalization \$150,000, shares 25 cts. par.

Property, 160 acres in the Penokee iron range, about 1 mile north of Bad river, shows fissure veins in greenstone, diorite and slate with E.-W. strike and dip of 70°. Three orebodies are claimed of which 1 is said to be 40' wide and traceable one-half mile by a strong gossan, with a slate footwall and diorite hanging. This is reported to have chalcopyrite in a quartz gangue. Ores give assays up to 9 oz. silver and \$3 gold per ton. Development is by shafts of 150' and 188'. Equipment includes a 16-h. p. hoist.

HOME COPPER CO.**ARIZONA**

Almost dead. Office and mine: Morenci, Graham Co., Ariz. H. J. Degener, pres.; W. A. Leonard, vice-pres.; W. P. Gee, sec.-treas.; N. L. Jenkins, supt., at last accounts. Organized April, 1901. Lands, 35 claims, 700 acres, in 2 groups, also a mill site on Eagle river. The Peacock group of 23 copper claims, about 1 mile southwest of Morenci, is opened by an 85' shaft and by tunnels of 150' and 700', latter giving a 500' back. Ores are carbonates and oxides, with some chalcocite, also a wide ledge of low-grade ore too lean for present working. The Buzzard Shadow group of 12 claims has been sold. Has gasoline power. Company comatose, as promoters were unable to inspire confidence and could not raise enough money to prospect the property sufficiently to prove if it has merit. Not a "wild cat" but a mistake.

HOME COPPER MINING CO.**MONTANA**

Operating a group of claims at Mindin, Meagher Co., Mont.

HOME RUN COPPER CO.**NEVADA**

Office: 1118 Newhouse Bldg., Salt Lake City, Utah. Mine in Bristol mining district near Pioche, Nev. M. C. Godbe, pres.; E. S. Woodward, vice-pres.; H. F. Earle, sec.-treas.; preceding officers, A. H. Godbe and Henry Sadler, directors. Organized 1912, capitalization \$100,000, shares 10 cts. par.

Property includes 8 claims, 3 fractions, 180 acres, located 9 miles from railroad. Claims show fissures in limestone expanding into replacement deposits and caves carrying rich copper ores with gold and silver values. Properties adjoin the Gypsy mine and contain same fissures. Company also owns Bristol mine from which shipments of 1 car a week were made in 1913.

Development by 225' shaft with levels at 90' and 150' opening up caves,

showing 1,500 tons of ore containing 8.25% copper and 40 to 200 oz. silver. In Aug., 1913, drift on 90' level showed 4' of 26% copper ore carrying 35 oz. silver per ton.

Equipment includes gasoline engine and necessary buildings.

HOME RUN COPPER MINING CO.

WYOMING

Office: Rooms 17-18, Postoffice Bldg., Colorado Springs, Colo. Mine near Rudefeha, Carbon Co., Wyo. A. L. Bohrer, pres.; J. F. Humphrey, vice-pres.; Adolph Fehringer, treas.; Wm. C. Robinson, sec., at last accounts. Capitalization \$1,500,000, shares \$1 par. Lands, 180 acres, partly patented, known as the Copper Bell group, near the Ferris-Haggarty mine, having a 350' tunnel showing a vein of 30" to 9' width assaying up to 12% copper, with gold and silver values. Idle.

HOMESTAKE MINE.

UTAH

Property located about 25 miles west of Cedar City, Iron Co., Utah, was reopened in 1912 after about 8 years idleness, owing to long wagon haul and encountering of water in the workings. Property said to contain large deposits of lead and copper ore.

HOMESTEAD COPPER, GOLD & SILVER MG. CO.

WISCONSIN

Idle. Property near Iron Mountain, Dickinson Co., Mich. Eric Hager, pres.; Andrew Nelson, sec.; E. W. Holm, treas., at last accounts. Organized 1906, under laws of Wisconsin, capitalization \$1,000,000, shares \$1 par. Lands, 90 acres leased, situated 8 miles south of Iron Mountain, in Florence county, Wisconsin, have 100' incline shaft, showing a vein 2" wide at surface, with extreme width of 18" at depth, giving assays, from selected samples, up to 10% copper and \$3 per ton in combined gold and silver values. Shut down for many years.

HOMESTEAD COPPER MINES CO.

OREGON

Idle. Mine at Homestead, Baker Co., Ore. L. L. Carter, supt., at last accounts. Organized 1906, under laws of Arizona, capitalization \$1,000,000, shares \$2 par. No trace of operations secured.

HON MINING CO.

CALIFORNIA

Address: care Harvey Hon, Parker, Ariz. Company owns claims in Copper Basin, northwest of Monument peak, 15 miles by road north of Parker. Copper occurs as chalcopryrite, chalcocite and oxidized minerals in a shear zone 2 to 3½' wide in schistose granite alongside of diabase. Development by 100' shaft with orebody exposed by drifting at that depth. Company deepened shaft in 1911.

HONEST ENDEAVOR MINING CO.

NEVADA

Mine address: Yerington, Lyon Co., Nev. B. W. Wooding, pres.; Elmer Hoff, vice-pres.; C. S. Wood, sec.; F. D. Goodale, treas. and gen. mgr., at last accounts. Organized 1907, under laws of Arizona, capitalization \$2,500,000, shares \$1 par.

Company owns 11 claims in Buckskin district, west of and across the valley from Ludwig, the railroad terminus, and 3½ miles from Buckskin, in the Yerington district. Group consisted of 4 claims, to which the Union Blue was added in 1910. Development is by 300' shaft and drifts opening up 2 veins, showing 2' of sulphide ore with commercial values. Equipment includes hoist, compressor, etc. Is a small but promising mine.

HOOSIER BOY COPPER CO.

OREGON

Absorbed by the Indiana Mining Co., 1912. Formerly at Medical Springs, Baker Co., Oregon.

HOP CANYON MINING & SMELTING CO.

NEW MEXICO

Address: care Alpheus McCallum, 154 West Randolph St., Chicago. Mine address: Magdalena, Socorro Co., N. M. Elias G. Raffety, sec.-treas., Oscuro, N. M.; Alexander McCallum, Magdalena, N. M.; J. A. Pement,

Chicago, and H. Raffety, Oscuro, directors. Capitalization \$1,000,000, shares \$100 par.

Property comprises 11 claims, 220 acres, 3 miles from Santa Fe R. R., in Hop Canyon district. Claims show a shear zone in rhyolite running N. 25° W. with steep dip northeast. Surface shows thin seams of oxidized ore, developed by 1,550' crosscut tunnel and 1,450' of other work. Operations were resumed in 1912. Company said to be clear of indebtedness and expects to ship ore in 1913. Government report states conditions do not warrant the expectation of finding important bodies of ore.

HORN SILVER MINING CO.

UTAH

Office: 59 William St., New York. Operating office: 206 Templeton Bldg., Salt Lake City, Utah. Mine office: Frisco, Beaver Co., Utah. Jacob Neadle, pres. and treas.; Alexander B. Simonds, vice-pres.; Edward F. Emmet, sec.; preceding officers, Harvey N. Wadham, E. B. Critchlow, A. B. Simonds, W. R. Britton, Chas. Brenneman, Chas. H. Doolittle and H. S. Young, directors; Benjamin B. Lawrence, cons. engr.; Wm. H. Hendrickson, mgr. Organized 1879, under laws of Utah, capitalization \$10,000,000, shares \$25 par. Has paid dividends of \$5,642,000, last having been paid in 1907. Net profit for year ending Jan., 1913, was \$8,606.

Lands, 19 claims, 9 patented. The mine is extensively developed, and has been a large producer of zinc, lead, silver and gold, and has yielded some copper as a byproduct. The old bonanza mine carried good values to depth of about 800', showing silver ores on the footwall, with copper ore on the hanging. Main shaft is 1,600' deep, but stoping is mainly above the 900' level. During 1910 a new body of slightly argentiferous copper ore was being developed on the 750' level.

Development for 1912, comprised 1,483', of which amount 208' was on 700' south drift in Lulu ground. Development work was mainly to the south, opening up 2 zinc and 1 lead stope on continuations of the main orebodies.

Equipment includes a 30-stamp mill. Production was shipped, under a 2-year contract, ending 1911, to the American Smelting & Refining Co., shipments, 1909, being said to have averaged about 20% lead and 20 oz. silver per ton. Zinc ore, carrying up to 10% lead and 5 oz. silver, is shipped to Colorado and Kansas zinc plants. Production was suspended, 1907, for the first time in 20 years, because of temporary inability to market ore. Production was only 4,490 tons of ore in 1908, and 11,189 tons of ore, including 1,006 tons of first-class copper ore, in 1909, when the value of all ore sold was \$120,189.21, with total net earnings, including returns from store and rentals of \$132,570.87.

Production was 577,578 lbs. fine copper in 1901; 717,353 lbs. in 1902; only 6,539 lbs. in 1905, and was 24,508 lbs. copper, 3,583,355 lbs. lead, 1,244,182 lbs. zinc, 206,537 oz. silver and 2,841 oz. gold in 1907. The mine was a bonanza silver producer for many years, but has seen its best days and since 1906, has done but little better than make expenses, though it seems probable that some small further profits will be secured from production.

A disastrous cave-in damaged the shaft and workings in the Autumn of 1912, costing \$20,000 for repairs and stopping ore extraction and development. Shipments were resumed, Jan., 1913.

HORSE MOUNTAIN COPPER CO.

CALIFORNIA

Mine office: Eureka, Humboldt Co., Cal. David Wilson, pres.; George Wilson, mgr., Eureka, Cal.; D. W. Stapp, supt. Organized Nov., 1910, capitalization \$1,000,000. Lands, 35 claims, in vicinity of the Humboldt Copper Co. with which this corporation apparently is connected in ownership and management.

Owens Ruby Copper property on Horse mountain, in the Hoopa range, Horse River district, on the watershed between Redwood creek and Trinity river, in T. 6 N., R. 1 E. For miles copper occurs along a serpentine-gabbro contact; claims show native copper in a vein 30' thick having 2' of high-grade ore.

Development is by 6 tunnels, No. 6 of 900', another of 450', 1,500' in all. Equipment includes a \$12,000 50-ton concentrator with Huntington mill, installed in 1912; in 1913 concentrates were sacked and shipped by pack train to Korb, on Arcata and Mad River railroad, thence by steamer from Eureka to the Tacoma smelter.

HORSESHOE COPPER CO.

IDAHO

Idle. Assessment work only being done. Mine office: Mackay, Custer Co., Idaho. J. C. Fox, pres.; J. H. Greene, vice-pres.; D. V. Archbold, sec.-treas.; Mackay, Idaho; preceding officers, Geo. L. Morgan, C. V. Hansen and S. K. Paxton, directors; C. V. Hansen, mgr. Capitalization \$1,000,000, shares \$1 par. Total assessments to date, \$3,000. Company owns 17 claims in Alder Creek mining district, adjoining the White Knob mine of the Empire Copper Co. on the north.

HORSESHOE MINING CO.

WASHINGTON

Idle. Office: 315 Hinkley Bldg., Seattle, Wash. Robert Steiger, pres.; K. O. Rosenquist, vice-pres. and supt.; E. G. Moe, sec.; Harold Gangmark, treas.; preceding officers, E. Battleson and Swan Hansen, directors. Organized June 7, 1904, under laws of Washington, capitalization \$1,000,000, shares \$1 par, nonassessable; issued, \$621,571. Annual meeting Oct. 15.

Property, 7 claims, about 144 acres, with a 10-acre mill site and several water-rights, well watered, and about 25% timbered, in the Summit district, near Mount Defiance, between the middle and south forks of the Snoqualmie river, 6 miles from the Northern Pacific railway and 12 miles east of North Bend. Property shows granite, porphyry and slate, with 5 ore-bodies, occurring as fissure veins in granite, and between granite and slate, of which 1 is gold, 1 lead and 2 copper, reported by management as 6" to 60' in width, carrying chalcopryite and galena, assaying 1 to 32% copper, 43.7% lead, trace to 31.3 oz. silver and 0.12 oz. gold per ton. Development is by No. 1 tunnel of 66', No. 2 of 226', and No. 3 of 567', with 1,300' of workings. Mine has no power equipment or buildings, but plans patenting lands, building a wagon road, developing a small water power, and building a sawmill.

HORST-POWELL COPPER MINING CO.

IDAHO

Closed down. Address P. O. Box 2221, Spokane, Wash. Mine near Kingston, Shoshone Co., Idaho. E. E. Horst, pres.; E. L. Powell, vice-pres. and treas.; Mark F. Mendenhall, sec. Capitalization \$1,000,000, shares \$1 par, nonassessable. Lands, 7 claims and a 5-acre mill site, well timbered, on the Little North Fork river. Development is by 3 tunnels, 300', 600' and 200' long, and 2 shafts, 50' and 100'. Vein is of 15' estimated surface width, opened up for 800' and proved to depth of 400' with slate foot-wall and quartzite hangingwall, carrying copper ore averaging 5%. Equipment includes steam and gasoline power, with a hoist and necessary mine buildings.

HOSEY MINE.

ARIZONA

P. O. Patagonia, Santa Cruz Co., Ariz. Lands in Wrightson mining district, Santa Rita mountains, 12 miles west of Patagonia. Claims show fissure veins carrying high-grade chalcopryite and glance ore developed to a depth of 200'. Shipments of several carloads have been made. Shaft now caved in, but property favorably reported upon by John Daniells, of Calumet, Mich.

HOTCREEK SYNDICATE TRUST.**NEVADA**

Idle. Property at Hotcreek, via Tonopah, Nye Co., Nev. Victor Barndt, trustee; John Lawton Butler, sec. Is not incorporated. Lands, 32 claims, unpatented, in Rattlesnake canyon, showing limestone and andesite, carrying replacements in limestone near porphyry contacts, and fault planes; orebodies reported by company to be 2 to 25' in width and traceable from 400' to more than 2,000'. Development is by about 1,000' of workings, showing copper ores averaging 2 to 3% copper, 5 to 10 oz. silver and \$1 gold per ton. Ore at water level is disseminated chalcopyrite, of concentrating grade.

HOUGHTON-ALASKA EXPLORATION CO.**ALASKA**

Office: Houghton, Mich. Mine office: McCarthy creek, Copper River district, Alaska. J. H. Rice, pres.; Deen L. Robinson, sec.; W. B. McLaughlin, treas.; preceding officers, Dr. L. L. Hubbard and F. G. Coggin, directors; Theo. J. Welcker, cons. engr.; Ocha Potter, mgr. Organized 1905, under laws of Michigan, capitalization \$500,000. Property is under option to the Mother Lode Mines Co., of Alaska, for \$150,000 cash and 250,000 shares of stock.

Lands, 30 claims, 380 acres, of which 12 claims, 180 acres, are in process of patenting, also a 5-acre mill site and 160 acres placer lands, held for town site and general purposes. Lands adjoin the Bonanza group of the Kennecott Mines Co., on the northeast, and are on the McCarthy Creek slope of the divide, the Bonanza group being on the Kennecott slope. About 1,000 h. p. is available from McCarthy creek, for a hydro-electric installation.

The Bonanza fault, traceable 7,000', consists of a 6" to 12' fissure filled with brecciated limestone, with mineralization in places up to 100' width, on the fault and along the stratification planes of intersecting veins. The Bonanza fault has a series of fissures cutting the main fault, with mineralization along both, at and near the points of intersection, but where other fissures intersect the cross fissures, only the Bonanza fault is mineralized. Ore is exclusively chalcocite, except at surface, where sometimes broken down to carbonates, and the ore is pockety. Development consists of only 123' of tunnels, as all work was exceedingly expensive, and there was no particular object in developing extensively until transportation facilities were secured. The Copper River railroad now completed to Kennecott gives this property mixed rail and water shipping facilities, by steamer on the Chitina river, 24 miles to the railway. Management considered good.

HOUGHTON COPPER CO.**MICHIGAN**

Office: 199 Washington St., Boston, Mass. Mine office: Houghton, Houghton Co., Mich. Chas. J. Paine, Jr., pres.; Geo. P. Gardner, vice-pres.; A. E. Coe, sec.-treas.; preceding officers, N. H. Stone, Jas. P. Edwards and Fredk. W. Nichols, directors; Dr. Lucius L. Hubbard, gen. mgr.; Rex R. Seeber, cons. engr.

Organized Jan., 1910, under laws of Michigan, capitalization \$2,500,000, shares \$25 par, assessable; issued, \$1,675,000, \$7 paid. Is controlled by St. Mary's Mineral Land Co., through ownership of 37,228 shares of the 67,000 shares outstanding. Old Colony Trust Co., Boston, registrar; State Street Trust Co., Boston, transfer agent.

Annual report for year ended Dec. 31, 1912 shows: Receipts (assessment No. 1) \$63,255. Expenses at mine, \$42,163; general expense, taxes, interest and insurance, \$7,234.

Lands, 23 acres of surface rights, with mineral rights to 160 acres owned in fee, being the N. W. $\frac{1}{4}$ of Sec. 14, T. 54 N., R. 34 W., lying east of the Isle Royale mine and adjoining the Superior mine. Diamond

drilling was begun March, 1910, in the horizon of the Baltic-Superior bed, showing 2 cupriferous amygdaloidal beds, the Superior and East lodes being 17' and 20' wide respectively, with dip of 51°, separated by about 83' of trap and conglomerate, the lower bed overlying another conglomerate at a distance of about 150', these strata corresponding exactly with the Baltic formation. Maximum operating depth is figured at 2,800'.

Development is by a shaft, started Sept., 1910, sunk about 60' in the footwall, which was 620' deep, April 1, 1913. A winze sunk 200' below the 620' level discloses rich copper rock in the Superior lode. The ground penetrated by the shaft is soft and badly broken, necessitating close timbering and occasional concreting, and the shaft has been lined with a concrete collar for depth of 300'.

Development in 1912 included 1,300' drifts on 620' level on Superior lode; 200' winze below 620' level and 141' drifting from bottom, in high-class rock; 60% of rock from Superior lode goes into ore pile.

Equipment includes a small power plant, and a 16-drill Nordberg electric air compressor. There are necessary buildings, including an office, changing house and warehouse, all of wood.

The property, though small, for the Lake Superior district, is considered promising and management good. Company employs about 35 men.

HOWARD COPPER CO.

MONTANA

Mine, if any, near Flint station, N. P. R. R. Granite Co., Mont. Described Vol. X.

HOWE SOUND CO.

BRITISH COLUMBIA

Office: 747 Fifth Ave., New York. Mine office: Britannia Beach, in the Vancouver district, B. C. Grant B. Schley, pres.; Evander B. Schley, vice-pres.; Kenneth B. Schley, sec.-treas.; preceding officers, Dennis Sullivan, E. J. Berwind, Louis S. Noble, M. Gavin, J. W. D. Moodie, W. J. Walworth, G. B. Schley, Jr., and Chas. G. Raynor, directors; Jas. E. Manner, clerk. Organized Aug. 22, 1903, under laws of Maine, capitalization \$3,000,000, shares \$1 par; issued, \$984,150. Bonds, \$1,000,000, convertible into stock at par. Bankers Trust Co., New York, transfer agent. Annual meeting, third Monday in March.

The company is a securities-holding corporation, controlling the Britannia Land Co., Ltd., also the Britannia Mining & Smelting Co., Ltd., which took over the properties of the Britannia Copper Syndicate, Ltd., and the smelter of the Britannia Smelting Co., Ltd., in 1908.

H. T. & C. CO.

UTAH

Idle. Mine address: Tooele, Tooele Co., Utah. Jos H. Hurd, pres., Salt Lake City, Utah; John B. Taylor, Taylor, Utah, vice-pres.; Walter A. Cook, sec.-treas. Organized 1906, under laws of Utah, capitalization \$100,000, shares \$5 par, assessable; fully issued. Five assessments have been levied. Is a close corporation, with only 5 stockholders. Lands, 30 claims, in Pine Canyon, West Mountain section, Tooele county, with water rights, tunnel rights and franchise for a deep tunnel, from Pine Canyon into the Bingham district, also several hundred acres of bench lands, and an 800-acre smelter site, 4 miles from the International smelter. Claims show veins with lead and copper ores.

HUALAPAI MINING CO.

ARIZONA

Probably dead. Mine at Cave Creek, Maricopa Co., Ariz. Lands, in Moore's gulch, in vicinity of the Rogers Springs Mining Co., are slightly developed.

HUB MINING INVESTMENT CO.

ARIZONA

Probably dead. Letter unclaimed at Benson, Cochise Co., Ariz. W. C. Ferris, pres.; J. W. Hill, mgr., at last accounts. Lands, 25 miles north-

west of Benson, are the San Domingo group, adjoining the Valenzuela Copper Mining Co., showing a 4 to 6' outcrop, carrying cuprite, melaconite and malachite, with gold values. Development is by a crosscut tunnel.

HUBBARD-ELLIOTT COPPER CO.

ALASKA

Offices: 319 So. La Salle St., Chicago, Ill. Home office: 411 New York Block, Seattle, Wash. Mine office: Elliott Creek, Chitina district, Alaska. Jerome G. Steever, pres.; H. P. Elliott, first vice-pres.; Thomas S. Hopkins, second vice-pres.; A. J. Elliott, sec.; John T. Evans, treas.; Carl Hauser, mine supt.; Earl C. Stroup, mech. engr. Organized Jan., 1911, under laws of Washington, capitalization \$3,500,000, shares \$1 par; 1,500,000 shares issued in exchange, share for share, for stock in the old Hubbard-Elliott Copper Mines Development Co., of Alaska; 2,000,000 shares treasury stock.

Company owns 35 patented claims, 4 mill sites all with U. S. government titles and 84 unpatented claims, total area of over 2,400 acres, also 300 acres of timber, covering over 6 miles in Elliott Creek valley. Elliott creek is an affluent of the Kotsina river, about 15 miles above junction of the Kotsina with the Copper river.

The copper ore occurs in fissure veins and associated replacement ore-bodies in greenstone with limestone beds above it. The prominent outcrops are practically all on the north side of Elliott creek, near the contact, which runs N. 75° W. and dips 80° N. All outcrops are in the greenstone underlying the limestone beds except on the Leland and Lawton claims which are in a well-defined porphyry dike. Above the limestone is found a heavy capping of conglomerates.

The principal ore minerals are bornite, glance and chalcopyrite. The total absence of surface oxidation due to glacial action is notable and sulphides occur in a calcitic matrix in the veins and with a greenstone matrix.

Development is mainly by the Albert Johnston tunnel, now 836' long with 700' more to reach the vein. This tunnel is in the gulch 500' below the old tunnel on the same claim which crosscuts the outcrop for 48', all in ore ranging from 4 to 22% copper. The outcrop averages 40' wide and is exposed for 350' in length. The new tunnel will be 390' below it and it is hoped that this work will develop sufficient tonnage to warrant the building of a branch of the Copper River & Northwestern railroad from Elliott Junction to the property, a distance of 15½ miles.

Equipment includes compressor, drills, and all necessary accessories and supplies amounting to 78,000 lbs., purchased from the Chicago Pneumatic Tool Co., whose engineers installed the machinery in the spring of 1913. With this equipment it is expected that the tunnel will be completed this Fall.

There has been a large amount of money expended in former years on scattered tunnel and opencut work of no real benefit, and for patenting the claims, but the development work now in progress is practically the first mining work prosecuted under competent advice since the organization of the company. The completion of the tunnel should determine the real value of the great outcrops and promising surface indications of the property. The past history of the company is a serious handicap to its officers, but the present management is reversing the policy of its predecessors and endeavoring to develop and work the mine and not the public. A lawsuit brought by the old company to set aside the reorganization of the property was non-suited in Feb., 1913. Mineral lands regarded as promising.

HUDSOONER MINING CO.

UTAH

Address: T. N. Haymond, pres., Salt Lake City, Utah; D. B. Ralls,

vice-pres.; J. Claude Davis, C. M. Needham, A. L. Ward, T. F. Gleason and Geo. Ladd, directors. Capitalization \$750,000, shares 1 ct. par. Owns the Sooner, Grand Prize, G. P. No. 1, Baltic and Anchor claims, adjoining the property of the Western Utah Co. in Deep Creek district.

Development by 18' and 50' shafts, shows 4' orebody of complex silver-lead and copper ore carrying \$35 to \$50 in value.

HUGO GOLD & COPPER MINING CO.

MONTANA

Office: Wallace, Idaho. Mine office: Saltese, Missoula Co., Mont. Richard W. Seideman, pres.; P. R. Levy, vice-pres.; R. M. Hamilton, sec.; A. G. Kerns, treas. Organized 1907, capitalization \$1,000,000, shares \$1 par.

Lands, 3 claims, carrying the extensions of the Boston-Colby vein system, next east of the New York & Brooklyn mine, and shortly east of Saltese. Property carries 2 parallel veins, 300' apart, 1 of about 15' width, showing copper carbonates, bornite and chalcocopyrite, giving assays, from selected specimens of 14 to 33% copper, the second vein, proven by trenching, being about 12' wide, carrying a 3' paystreak of ore assaying 12% copper, 10 oz. silver and \$8 gold per ton. Developed by 2 drift tunnels, 200' and 700' long that follow the vein. An overshot water wheel, taking water, under a 12' head, from the St. Regis river, runs a 4-drill air compressor.

HUIRIACHIC; COMPAÑIA MINERA DE.

MEXICO

Idle several years. Mine at Chalchihuites, Sombrerete, Zacatecas, Mex. John Stenner, pres.; C. A. Phelps, treas. and gen. mgr., at last accounts. Ores are argentiferous and auriferous chalcocopyrite and galena, developed by shaft and tunnel.

HULBERT MINE.

COLORADO

H. C. Bolsinger, mgr., Central City, Gilpin Co., Colo. This well-known gold-silver mine has recently opened up an 8" pay streak of copper-gold ore on the 1,150' level west, that assays 13.6% copper, \$120 gold and 46 oz. silver per ton, with 2' of milling ores alongside.

HULBERT MINING CO.

MICHIGAN

Idle. Albert S. Bigelow, pres., 199 Washington St., Boston, Mass. W. A. S. Chrimes, sec.-treas.; Fred W. Nichols, agt., Houghton, Mich. Organized about 1865, in Michigan, capitalization \$1,000,000, shares \$25 par; all issued.

Owns 1,640 acres of mineral land, all in Houghton and Keweenaw counties, Michigan, undeveloped; part of the surface rights have been sold, but mineral rights reserved. No mining done since organization.

HULL COPPER CO.

ARIZONA

Office and mine: Jerome, Yavapai Co., Ariz. Hon. Geo. W. Hull, pres. and gen. mgr.; S. F. Dennison, vice-pres.; Mary A. Hull, sec.-treas.; preceding officers, August Humbert and R. A. Pullen, directors. Organized 1906, under laws of Arizona, capitalization \$10,000,000, shares \$1 par, fully issued; bonds, \$250,000 authorized.

Ex-Mayor Hull, of Jerome, controls both this and the Cleopatra Copper Co., which together own an area west of the town of Jerome and bordering the United Verde on the south and west.

Lands, 21 claims, partly fractional, patented, area 249 acres, show syenite, diorite and slate, a continuation of the formation of the United Verde adjoining, reported by company to show 21 orebodies, carrying some oxidized ores, but mainly sulphides, as developed. The "1888" shaft, of 475' depth, about 200' from the United Verde smelter, has produced a small amount of ore, but not at a profit.

The Hull property and that of the Cleopatra Copper Co. have been developed by a 5,200' adit driven from Deception gulch, through Cleopatra

ground into the Hull property. A winze has been started on the lode at 5,000' from the portal.

The Dillon tunnel extends completely around two sides of the United Verde ground. There are many drifts branching out from the tunnel and these usually follow a fracture plane in the rock showing 1 or 2' of fractured country rock, which usually shows pyrite and may be slightly copper stained. These drifts twist and turn in a manner showing lack of system and finally branch out like a tree, each branch following a fracture plane, some of which show 2 or 3" of copper ore, and some are not even copper-stained. These fracture planes are described as being "leaders" from the big orebodies below, and because the country rock contains a small amount of pyrite disseminated through it, these ragged workings were stated to block out low-grade concentrating ore.

On the Silent claim a drift from the tunnel exposed an irregular body of excellent chalcoppyrite from which 2 shipments were made, the ore assaying $8\frac{1}{2}\%$ copper. The stope is about 60' long, in places is 12' wide and of irregular height. A 160' raise shows it to branch into 2 seams of 2' and 3' wide. An inaccessible winze was said to show 13' of ore, but inasmuch as shipments had ceased, this seems questionable. Beyond this orebody the tunnel turns the southwest corner of the United Verde property and follows along its western boundary to the "1888" shaft. For part of this distance the tunnel follows a lens of quartz devoid of copper. Aside from the 1 lens of chalcoppyrite mentioned the showing in the tunnel is exceedingly discouraging. The mine has upwards of 2 miles of openings, but the manager states that these old workings are not deep enough to develop the extension of the main orebodies of the United Verde.

Equipment includes a 94-h. p. steam plant and a gasoline engine, with 2 hoists, one being a steam hoist, installed 1909, at the "1888" shaft. There also is a small air compressor.

The advertising done in behalf of the company by Mr. O. B. Stanton, in 1907, was untruthful, and indefensible. Property not favorably considered as combined capitalization of this and the sister company, the Cleopatras, is \$20,000,000, none of which is in the treasury. Property reported optioned for 2 years to an English syndicate, in Aug., 1913, and H. C. Shotweel of Prescott, Ariz., named as manager.

HUMBOLDT CONSOLIDATED MINES CO.

ARIZONA

Mine office: Humboldt, Yavapai Co., Ariz. Benj. Rybon, vice-pres. and acting gen. mgr.; Dr. B. S. Bowen, treas. and gen. mgr. Lands, near McCabe, were under development, with a force of about 10 men, at last accounts. The property has a gasoline hoist.

HUMBOLDT COPPER CO.

CALIFORNIA

Mine office: Eureka, Humboldt Co., Cal. Apparently this corporation is a twin of the Horse Mountain Copper Co. Lands, 22 claims, well watered, adjoining the Horse mountain, said to show strong veins giving a good showing of copper ore, including chalcocite assaying up to 55% copper. Property said to have been bonded, late 1910, to eastern interests, but no trace of operations secured. For account of property see Horse Mountain Copper Co.

HUMBOLDT COPPER CO.

MICHIGAN

Idle. Office: 62 Devonshire St., Boston, Mass. Mine office: Copper Falls, Keweenaw Co., Mich. John C. Watson, pres.; John Brooks, sec.-treas.; M. A. O'Neill, W. H. Currier and Wesley Clark, directors. Organized 1863, under laws of Michigan, capitalization increased later to \$1,000,000, shares \$25 par. Amount paid in is \$100,000 in real estate, and \$240,986.76 in cash. Annual meeting, fourth Tuesday in March.

Lands are Secs. 16 and 21, the former fractional, T. 58 N., R. 31 W., all on the mineral belt, about midway between the Arnold and Phoenix mines, lying north of the greenstone, with the Eagle River and Natick mines to the south. The mine, opened 1853, though never a producer, has a single shaft about 300' deep sunk on the ashbed, which shows the same characteristics as at the Arnold, carrying occasional bunches of rich ground. Equipment includes an engine house, compressor building, smithy, warehouse and 4 dwellings.

HUMBOLDT COPPER CO.**NEVADA**

Idle. Letters to Sulphur, Humboldt Co., Nev., and San Francisco, Cal., unclaimed. E. J. Miley, pres.; C. C. Darling, Jr., vice-pres.; M. P. Danly, sec.; preceding officers, E. B. Grace and Dr. Geo. E. Ebright, directors. Organized under laws of Arizona, capitalization \$1,000,000, shares \$1 par. Company states that it has 8 claims, on Jackson mountain, 75 miles north northwest of Humboldt, in the Jackson Creek district, connected by a good wagon road, with the W. P. R. R., 30 miles distant. District shows granite and limestone with contact deposits and veins. The mine is claimed to have 1,400' of workings showing a vein of 12' width at surface, widening to 74' in the lower tunnel, averaging 15 to 16% copper, 3 to 5 oz. silver and \$1.65 gold per ton. Company is regarded with suspicion.

HUMBOLDT ORE CO.**ARIZONA**

Mine near Humboldt, Yavapai Co., Ariz. Is controlled, through ownership of practically entire stock issue, by Consolidated Arizona Smelting Co.

HUMBOLDT SMELTER.**ARIZONA**

Owned by Consolidated Arizona Smelting Co., at Humboldt, Yavapai Co., Ariz.

HUMBUG MINING CO.**UTAH**

At Eureka, Juab Co., Utah. Merged with Uncle Sam Consolidated Mining Co., which see.

HUNT MINING & MILLING CO.**IDAHO**

Probably dead. Office: 8 India St., Boston, Mass. Mine near Weiser, Washington Co., Idaho.

HURON GOLD CO.**ARIZONA**

Idle. Office: Jerome, Ariz. Mine office: Huron, Yavapai Co., Ariz. Geo. W. Hull, pres.-treas. and gen. mgr.; H. E. Wilcox, sec. Organized under laws of Arizona, capitalization \$1,000,000, shares \$1 par. Property, 5 claims, 80 acres, known as the Swindler mine, in the Big Bug district, having a 125' shaft and 680' tunnel, with upwards of 1,000' of workings, showing a vein up to 18' width, carrying ore giving assays of 2.5 to 11% copper and \$5 to \$30 gold per ton. Is said to have 800 tons of ore on the dump. Inactive since 1903, except for annual assessment work.

HUSSEY-HOWE MINING CO.**MICHIGAN**

Address: care C. A. Senecal, Lake Linden, Mich. Geo. W. Guthrie, Geo. W. Howe, Wm. H. Rea, C. G. Hussey, F. B. Nimick and G. H. Childs, all of Pittsburgh, are the other directors. Capitalization 100,000 shares, \$25 par; 54,000 shares issued, fully paid, 45,000 going to owners for property, 9,000 to be sold for development.

Property 320 acres, bounded by Indiana and Bohemia ground, includes N. E. $\frac{1}{4}$ Sec. 22, N. W. $\frac{1}{4}$ Sec. 23, T. 51, R. 57 W. in Ontonagon county. Property shows outcrop of the Eastern sandstone and 100' west of it an amygdaloid vein supposedly the Baltic lode of 2 veins. It shows copper carbonates and oxides over a width of over 100' resembling the Baltic outcrop at Champion, 25 miles northeast. As the dip is 60 to 65°, the property contains a valuable area for working.

HYDAH (HAIDAH) COPPER CO.**ALASKA**

Idle. Mine near Kasaan P. O., Prince of Wales Island, Alaska. Fred J. Eitel, pres.; J. A. Jackson, vice-pres.; Victor Vigelius, gen. mgr.; F. W. Crary, sec.; J. Albert Johnson, treas.; C. H. Waters, supt., at last accounts. Organized 1906, under laws of Washington, capitalization \$60,000. Company owns the Mammoth group, on the east side of Kasaan bay, 2,000' from tide water, developed by a 40x40' pit showing a contact orebody of 40' width, composed of magnetite with garnet, chalcopyrite and epidote, low in copper tenor and carrying up to \$2 gold per ton. A tunnel connects with upper bins, which in turn have a 2,100' tram line running to ore bunkers on the wharf, at tide water. Shipped some ore, 1907. Property considered promising. Company inactive in 1912, and has left no address at either the Alaskan or former Seattle office.

HYPOTHEEK MINING & MILLING CO.**IDAHO**

Secretary: Otto A. Olsen, Wallace, Idaho. Mine address: Kingston, Shoshone Co., Idaho. W. W. Davidson, pres.; George V. Harrington, mgr.; P. F. Rogers, supt.; preceding officers, J. H. Kirk and S. A. Covert, directors. Stock is assessable.

Lands, 9 claims, located, 1886, by Octave Guay, having 3 veins, 2 being of 10 to 20' estimated width, the third vein, known as the Great Western, of 8 to 25' width, having a 12 to 18" paystreak carrying native copper and cuprite, said to average 45% in copper tenor, and chalcopyrite, assaying up to 16% copper, balance of vein carrying low-grade ore, estimated to carry 2% copper, with small gold and silver values, with quartz gangue. Property also shows galena, apparently undeveloped.

Mine is opened by a 1,000' tunnel with a 500' blind shaft to the 1,000' level. The 523' level (750' below surface) opened up a fine shoot of commercial lead ore in 1912. The 800' level also shows an ore shoot 3 to 4' thick and 200' long, carrying chalcopyrite, with films of chalcocite in a quartz gangue, the ore giving average assays of 3.5% copper, 7 oz. silver and 67 cts. gold per ton. This is the deepest mining work in the Pritchard slates of the Cœur d'Alene sedimentary series, a formation hitherto considered unpromising. The finding of chalcocite at this mine below 1,000' of Burke quartzite contradicts the former views.

The mine is electrically equipped and has a 100-ton concentrator with Chilean mill, Wilfley tables, Frue vanners, etc. Property examined and reported upon by Jas. A. McEachran, 1911.

An aerial tram 3 miles long is soon to be installed to convey ore from the mine to the railway. Production, Oct., 1913, is about 200 tons of first-class ore a month.

IBEX MINING CO.**IDAHO**

Office: Mullan, Shoshone Co., Idaho. Is controlled by the Amalgamated Stock Holding Co., of Wallace, Idaho. Incorporated April 15, 1911, under laws of Idaho. Company still in existence, but comatose. Owns 4 claims adjoining Idaho, Boulder Creek and Bitter Root mines, three-fourths mile south of Mullan and 300' from N. P. R. R. Property shows 4' iron vein adjacent to a diabase dike. Developed by 2 tunnels, the lower starting from Cœur d'Alene river to cut vein at 700' below outcrop.

IBEX PLOMOSA MINING CO.**ARIZONA**

Idle. Letter unclaimed at Yuma, Ariz. Mine at Bouse, Yuma Co., Ariz. Thos. L. DeSpain, pres.; H. H. McPhaul, vice-pres.; Wm. C. DeSpain, sec.-treas., at last accounts. Organized 1907. Lands, 30 claims, with 28 claims said to have been added, early 1908, in the Plomosa moun-

tains, 12 miles south of Bouse, showing oxidized ores of high copper tenor, carrying up to \$4.50 gold per ton. Has gasoline power.

ICONOCLAST CONSOLIDATED MINES CO.

WASHINGTON

Succeeded by Tenas Mining Co.

IDA MONTANA MINING CO.

MONTANA

Office: Calumet Mich. Mine office: Butte, Silver Bow Co., Mont. P. D. McNaughton, pres.; Capt. Jas. W. Milligan, vice-pres. and mg. director; Wm. J. MacDonald, sec.; Jos. W. Selden, treas.; M. J. McEvans, supt., at last accounts; preceding officers, Wm. H. Thielman, F. P. Rupee, Victor Nordberg, Edward Ulseth, Angus McDonald and Jeremiah E. O'Neil, directors. Organized 1907, under laws of Arizona, capitalization \$3,000,000, as a reconstruction of the Ida Montana Development Co.

Owens 3 fractional claims, the Ida, "A" and "B," southeast of and next to the Butte & Duluth Co., at the base of the East Ridge mountain, across the Flat from Butte. Bought for \$175,000 and said to be fully paid for. The property lies outside of the proven ore zone in Butte.

The property has a 3-compartment shaft, sunk to 480' depth, which shows, on the 250' level, copper glance ore carrying silver and gold values; a little ore was shipped, 1908, by lessees.

Equipment, abandoned, wrecked by thieves and storms, has been carted away (1913). The mine was attached in 3 actions, Dec., 1907, for supplies furnished. The indebtedness was met by the personal advances of some of the officers and leading shareholders. The floating indebtedness is about \$30,000, apparently in the shape of notes, endorsed by the directors.

Idle for 5 years, but negotiations for sale of property were pending in 1913, as late developments in the neighboring Pittsmtont property and the adjacent Butte & Duluth mine of Capt. A. B. Wolvin have indicated the potential worth of the Ida-Montana ground. This sale when completed should give the old shareholders a substantial return after the floating debt has been paid off.

IDAHO BRIDE MINING & MILLING CO.

COLORADO

E. D. Payne, sec., and J. J. Hoban, gen. mgr., 227 Temple Court Bldg., Denver, Colo. Owns the Seaton mine near Idaho Springs, Colo. Property is an old gold-silver mine developed to 2,000' depth and showing small amounts of copper ore. New Company is energetically developing and is shipping 1,000 tons a month of milling ore.

IDAHO CONSOLIDATED MINES CO., LTD.

IDAHO

Property sold to Minnie Moore Mines Co., at receiver's sale, June, 1912. See Vol. X.

IDAHO CONTINENTAL MINE.

IDAHO

Address: care A. Klockman, pres., Spokane, Wash.; Albert Goodell, gen. mgr. Mine situated 26 miles from Port Hill, Bonner Co., Idaho, north of head of Priest lake. John D. Ryan, through the International Smelting & Refining Co., advanced \$325,000 for the development of the property on condition that it be given a 10-year contract to treat the company's ores, should name 3 directors and a manager and receive an option on 150,000 shares at 50 cts. a share.

Property embraces several claims showing a strong vein with a succession of ore shoots carrying galena and a little copper ore. Is an important new lead producer. A 300-ton concentrator has been erected and a 5-year ore-hauling contract was let Oct. 10, 1913. Output will be 30 tons concentrates daily after Jan. 1, 1914.

IDAHO COPPER CO.

IDAHO

Idle. Letters addressed to mine at Coolin, Bonner Co., Idaho, un-

claimed. G. H. Gordon, pres.; J. Matteshuck, sec., at last advices. Organized under laws of Washington, capitalization presumably \$500,000. Lands, 4 claims, on the western side of Priest lake. Development includes shafts of 67' and 40', latter showing an 18" vein, carrying chalcopyrite, galena and sphalerite. Equipment includes a 135-h. p. boiler, 50-h. p. engine and 2 New York pumps, coupled, serving as an air compressor.

IDAHO COPPER MINING CO.

IDAHO

Letters unanswered from 603 Palladio Bldg., Duluth, Minn. Mine in Lemhi Co., Idaho. Simon Clark, pres.; Henry Taylor, sec.-treas. Organized Aug. 16, 1909, under laws of Minnesota, capitalization \$100,000, shares \$100 par. No trace of operations secured.

IDAHO COPPER MINING CO., LTD.

IDAHO

Office: Wallace, Idaho. Mine office: Mullan, Shoshone Co., Idaho. John H. Nordquist, pres.; A. N. Stroud, vice-pres.; Geo. F. Stoney, sec.; A. H. Featherstone, treas.; W. H. Herrick, gen. mgr. Lands, 6 claims, 3 patented, on the Continental divide, between Idaho and Montana, near the head of Willow creek, in the Hunter district, west of the Reindeer Copper & Gold Mining & Milling Co., Ltd. Property carries about 4,500' of the strike of the extension of the Reindeer vein, and is developed through the 3,000' Reindeer crosscut tunnel, which opened a vein in Jan., 1913, showing 2½' of \$100 ore.

IDAHO-EAGLE MINING CO.

IDAHO

Declared fraudulent by U. S. postal authorities, 1912. Office: 300 Columbia Bldg., Spokane, Wash. Mine office: Lane, Kootenai Co., Idaho. John C. Kleber, pres.; Arthur A. Hale, vice-pres.; C. E. Mitchell, sec.; Geo. E. Canfield, treas.; R. G. Dunn, mgr. Organized March, 1910, under laws of Washington, as a reconstruction of the Cœur d'Alene Eagle Mining Co., which had a capitalization of \$1,500,000, shares \$1 par.

IDAHO GROUP.

ARIZONA

J. P. Hayward and Lyman C. Woods, owners, Winkelman, Ariz. Property in Dripping Springs district, Pinal Co., Ariz. Claims said to show veins in Paleozoic limestones and shales, cut by diabase and later monzonite porphyry. Shipments made, 1913, to El Paso smelter.

IDAHO MINING, REDUCTION & TRANS. CO.

COLORADO

Wm. E. Renshaw, manager, Idaho Springs, Clear Creek Co., Colo. Property, the Silver Age, Gem and Freightons Friend mines, showing veins with gold-copper ores.

Development is by several shafts and extensive tunnel workings. Is now operated by leasers. Equipment includes electric-driven compressor and hoist, and a 200-ton concentrator with 20 stamps.

IDAHO MINING & SMELTING CO.

IDAHO

Is the successor, 1912, of Clayton Mining & Smelting Co., and was reorganized, 1913, as the Red Bird Smelting Co. Properties are described under that title.

IDAHO-MONTANA AMALGAMATED MINING CO.

IDAHO

Owns the Idaho-Montana mine, near Kalka station, on the Great Northern R. R., 7 miles east of Bonner's Ferry, Bonner Co., Idaho. Developed by a 400' incline shaft which discloses a 2 to 4' vein in diorite, containing lead and silver values associated with iron sulphide, expected to develop copper with depth. Considered promising.

IDAHO & SPRING GULCH M. & M. CO., LTD.

MONTANA

Idle. Mine near Carter, Missoula Co., Mont. Fred Carson, pres. and gen. mgr. Is a small prospecting company, organized Oct. 30, 1906, under laws of Idaho, capitalization \$1,000,000 shares \$1 par; issued, about \$850,000, assessable.

Owens 7 claims, 110 acres, between the Little Pittsburg and King and Queen mines, 3 miles from 2 railways, in an unorganized district near Carter. Property shows porphyry, slate and limestone, carrying 2 veins, 1 of 6' width, traceable 2,000', reported to average 6% copper and 32 oz. silver per ton, mainly from gray copper ore. Development by shafts of 50' and 300', and tunnels of 60' and 700', the longer to be driven 1,700', to cut both copper and lead veins. The upper tunnel shows malachite and azurite, assaying about 7% copper, 1.4 oz. silver and 1 to 6 oz. gold per ton.

IDEAL MINING & MILLING CO.

ARIZONA

Mine office: McCabe, Yavapai Co., Ariz. John L. Davis, gen. mgr., Prescott, Ariz.; Jas. O'Brien, supt., Model mine at last accounts.

The Gladstone mine, with a 1,000' shaft, carries auriferous and argenterous copper and lead ores, values being mainly in gold. Formerly shipped high-grade ore and ran concentrating ore through the McCabe mill.

The McCabe or Model mine, 6 claims, bought 1906, for \$81,521, has a 750' incline shaft, with about 12,000' of workings, showing a vein formed of a series of lenses of banded quartz, with central band or vug cavity filled by crystals of quartz, arsenopyrite, chalcopyrite and pyrite carrying gold and silver. The workings have developed several orebodies carrying 8 to 10" of smelting ore, and 12 to 24" of milling ore, with values of \$35 to \$85 per ton. Country rock is schist, vein passing westward into a "stock" of quartz diorite.

Production was 518,895 lbs. copper, 139,766 oz. silver and 14,696 oz. gold in 1906; 361,257 lbs. copper, 117,582 oz. silver and 12,004 oz. gold in 1907; 116,012 lbs. copper, 25,107 oz. silver and 2,812 oz. gold in 1908, and 189,107 lbs. copper, 47,001 oz. silver and 6,256 oz. gold in 1909. No recent returns secured. Property considered meritorious.

IGNACIO RODRIGUEZ RAMOS, S. A.; COMPAÑIA

MINERA.

MEXICO

Idle. Owing to the Mexican revolution, no letters can be sent or received from the mine at Baca, Aliende, Jimenez, Chihuahua, Mex. Officers: Ing. Santiago Rodriguez, pres.; Lic. Alfredo E. Rodriguez, vice-pres. and managing director; Ignacio Rodriguez Ramos, gen. mgr.; Rafael A. Quiroz, mgr.; Ramon G. Aguirre, supt., at last reports. Organized, 1902, under laws of Mexico, capitalization 30,000 pesos, and reconstructed Aug. 17, 1906, capitalization 700,000 pesos, increased, 1911, to 10,000,000 pesos, shares 200 pesos par. The Compania Minera de Almoloya, S. A., was absorbed 1910.

Property, originally 15 hectares of the Cigarrero mine, is now 129 hectares, covering the mineral zone of the Sierra Almoloya, including El Cigarrero y Anexas, San Enrique, El Rayo, Las Carolinas, La Abundancia, La Cuauhtémoc, La Centella, El Relámpago, El Trueño and Los Plomosos mines. The geological conditions greatly resemble the Santa Eulalia camp. Ore occurs in limestone, in lenses, one under development having a width of 70' and length of 140', ore said to average 5% copper, 25% lead, 6% zinc, 15 oz. silver and \$8 gold per ton. Values are mainly in silver-lead ores, though chalcopyrite occurs as a byproduct.

The mine is extensively developed to a depth of 300 meters, by an 800' shaft and 2 main tunnels, with much rich ore in sight. Ore is sold to the American Smelting & Refining Co. About 300 men are employed.

Equipment includes steam and electric power, with a steam hoist and an air compressor. An experimental mill, with 3 stamps, is connected with the mine by a 4,000' incline tram.

Production has ranged from 20,000 to 35,000 metric tons of ore for some

years past, to the average value of about 1,000,000 pesos. Copper production is estimated at 750,000 lbs. fine copper in 1909.

IKEDA MINES, LTD.

BRITISH COLUMBIA

Idle. Letters to 448 Seymour St., Vancouver, B. C., unanswered. Mine office: Jedway, Moresby island, Queen Charlotte group, B. C. S. J. Castleman, gen. mgr.; Andrew G. Larson, cons. engr. and supt. Organized Sept., 1910, under laws of British Columbia, capitalization \$850,000, shares \$1 par. Property is the former holdings of the Awaya-Ikeda Co., Ltd., taken over for \$200,000, apparently with a \$50,000 cash payment, and balance of \$150,000 due on bond and lease.

Lands, the Lily group, 42 claims, 2,100 acres in several groups on Ikeda bay, at the southern end of Moresby island, 3 miles from Jedway, and connected therewith by government rail and telephone. Steamer connection is had with Vancouver, 450 miles distant.

The Lily group, 8 claims, 400 acres, crown patented in 1912, are on the southwestern side of Ikeda bay. These claims, the only ones on which mining has been done, were discovered May, 1898, by Arichika Ikeda, and developed by him until taken over by the present company, Sept., 1910. The group shows limestone and slate cut by dikes of greenstone and diorite, having well-defined flat fissures at right angles to and between the main fissures, which are practically vertical, the others being approximately horizontal and of great number. Ore occurs in a series of veins of 2 to 8' width, the largest orebodies lying along the horizontal main fissure. The vein principally developed is of 5 to 30' width, proven for 1,000' in length and about 300' in depth. The ore shoot, up to 20' in width, carries lenses of chalcopryrite, averaging, as mined, about 2.5% copper, with a gangue of silicious country rock and occasional stringers of quartzite and limestone. The ore mined by the former owners averaged about 4% copper, 2.2 oz. silver and \$2.25 gold per ton, with occasional rich ore carrying up to 12% copper, 60 oz. silver and \$5 gold per ton; was hand-sorted before shipment. Diamond drilling, 1910, is said to have shown 2 new orebodies, 1 opened by a 52' crosscut.

The Lily mine has 4 tunnels, Nos. 1, 2, 2½ and 3, all tunnels being connected by winzes. No. 2 tunnel is 350'; No. 2½ tunnel is 350' long; No. 3 tunnel, 940' long, has about 5' of argentiferous and auriferous chalcopryrite of good average tenor and ends in a 40x50' chamber from which considerable ore has been stoped, the ore in the chamber apparently being not the same as that followed in the tunnel, lying about 45' to the northward and found by crosscutting.

A 6,100' horse tram, of 36" gauge, connects the mine with a 150' wharf having a 110' ell, supplied with a 1,000-ton ore bunker, there also being one 400-ton and two 100-ton bunkers. The inlet is charted and admits steamers of fair size at flood tide. Equipment includes a steam plant burning wood, and a 3-drill Ingersoll-Sergeant air compressor. There are 12 buildings including a hospital, store, smithy, shops, boarding house, bunkhouse, warehouse, laboratory, dwellings for superintendent and engineer, and stable.

Production, to end of 1910 was about 12,000 tons of ore, of which 5,608 tons were shipped from Nov., 1906, to Aug. 3, 1908. Of these shipments 2,100 tons was first-class ore averaging 12% copper, 7 oz. silver and \$6 gold per ton, and 3,568 tons were second-class ore averaging 6% copper, 3 oz. silver and \$3 gold per ton, all shipped to the Tyee smelter, at Ladysmith, Vancouver island, B. C. These shipments gave net smelter returns of \$58,882, an average of better than \$10 per ton. Production is estimated at 125,000 lbs. of fine copper in 1907; 800,000 lbs. in 1908, and 600,000 lbs.

in 1909, with considerable gold and silver values. Property idle in 1912, save for assessment work on unpatented claims.

ILLINOIS COPPER & SILVER MINING CO.**WASHINGTON**

Idle. Letters to Pittsfield, Ill., unanswered. Mine at Keller, Ferry Co., Wash. J. C. Davis, pres. and gen. mgr.; J. D. Nighbert, vice-pres; A. Hamilton, supt.; preceding officers, J. E. Dinsmore and Wm. H. Hoover, directors; B. H. Swan, sec.; J. D. Hess, treas., at last accounts. Organized under laws of Washington, capitalization \$2,000,000, shares \$1 par, non-assessable, in \$1,000,000 preferred and \$1,000,000 common stock. Owns property near the Canadian boundary line, embracing 9 claims, in the San Poil district. The Columbia group of 4 claims, $3\frac{1}{2}$ miles from Keller, shows auriferous and argentiferous copper ores. The Oregon group has 300' of workings, including 2 shallow shafts and 2 tunnels, 1 of 112' length, developing a vein claimed to be 72' wide carrying a gossan showing low-grade ore.

ILLINOIS & JEROME COPPER CO.**ARIZONA**

Closed down several years and letters unanswered from Springfield, Ill., and mine at Ayutla, Autlán, Jalisco, Mex. E. A. Perry, pres.; Homer Vandevender, vice-pres.; Thos. Montgomery, sec.; J. T. Ash, treas.; John Breckenridge, gen. mgr., at last accounts. Capitalization \$1,000,000, shares \$1 par; issued, \$750,000.

Lands, 45 hectares, including El Crudo and El Bajio mines, latter an abandoned old mine. Property said to show 15 veins, main vein being 8 to 17' in width, traceable 2 miles. El Crudo shaft, of 225' depth, shows ore of 5 to 20% copper tenor, estimated to average 5% copper, 15 oz. silver and \$5 gold per ton. Mine, at last accounts, had about 3,000' of workings, estimated to show 50,000 tons of ore.

ILLINOIS & JEROME COPPER CO.**ARIZONA**

Idle many years. Mine at Jerome, Yavapai Co., Ariz. A. D. Zellanack, pres.; R. W. Wood, vice-pres.; Annie E. Zellanack, sec. Organized Aug., 1908, capitalization \$1,000,000, shares \$1 par. Lands, near the Copper Chief, are undeveloped.

IMLAY MINING CO.**NEVADA**

Office: 204 Herald Bldg., Salt Lake City, Utah. Mine near Imlay, Humboldt Co., Nev. Geo. W. Morgan, pres.; Hon. O. W. Powers, vice-pres.; R. E. Siddoway, sec., at last accounts. Organized April 19, 1907, under laws of Utah, as successor of Morrison Mining Co., capitalization \$500,000, shares \$1 par, assessable; fully issued.

Lands, 26 claims, unpatented, with 2 mill sites and a town site, 7 miles from Imlay. Mine has a vertical shaft, with about 4,000' of workings developing ore assaying up to 8.8% copper, 7.6% lead, and 0.18 to 66.5 oz. silver per ton, with gold values.

Equipment includes three 60-h. p. boilers, a hoist, air compressor and electric plant. Buildings include an office and shops.

The 50-ton mill was put in commission July, 1909. Shipments were begun about April, 1908, to the Selby smelter, of 1 carload weekly of ore running \$50 to \$100 per ton in assay value. Company employed 7 men during 1912.

IMPERIAL COPPER CO.**ARIZONA**

Office: Silver Bell, Ariz.. M. P. Freeman, receiver; Hon. F. M. Murphy, pres.; G. W. Dietz, sec.-treas. Company's affairs are being liquidated by M. P. Freeman, a receiver appointed 1910 in bankruptcy proceedings. A serious attempt is being made to bring about a reorganization and refinancing of the company and a resumption of operations by mine smelter and railway is confidently expected in 1914. Owing to the low

price of copper in 1910, the inability of keeping development work ahead of ore extraction, and to the loss of the working shaft by fire, the smelter could not be kept supplied with the 800 or 900 tons of ore a day requisite for economical operation. The property was therefore shut down and this led to the appointment of a receiver.

Organized May 15, 1907, under laws of Arizona, capitalization \$7,000,000, \$5,000,000 outstanding; shares \$10 par, nonassessable; fully issued. Bonds, \$2,000,000, at 6% mortgage income, under terms of which the company cannot distribute more than 6% annually to stockholders. Interest on bonds was defaulted July, 1910. Paid \$100,000 dividends in 1906, and \$200,000 in 1907, in 3 dividends of 2% each. Has been controlled through a majority stock ownership by Development Company of America and controls entire capital stock of \$900,000 of the Southern Arizona Smelting Co., which owns the company smelter at Sasco, 12 miles away and all the stock (\$800,000) of the Arizona Southern railroad. The fiscal year ends Sept. 30. Annual meeting, second Tuesday in November. Balance sheet for year ending Sept. 30, 1910 (plant closed since) shows current assets of \$44,349; mercantile department, \$66,809, and supplies, \$794, with a deficit of \$336,819. The property account shows mines purchase account \$5,530,000, equipment and buildings \$256,940, concentrator \$187,717, bond discount \$397,880, railroad \$45,077, development \$86,816, and other items \$15,258, a total of \$6,519,690. Liabilities, aside from stock and bonds, amount to \$1,425,618, of which amount \$121,902 is accounts payable, \$123,239 accrued accounts and \$1,080,000 bills payable.

Lands, 60 claims, patented, 1,000 acres, with mill and smelter sites and miscellaneous lands of 1,820 acres in the Silver Bell mountains, a small independent range having a granitic base, fragments of limestone series, a porphyry intrusion and many later andesite and trachyte dikes. The capping, of no economic importance, consists of rhyolite, andesite, tuff, detrital sand, conglomerate and recent basaltic flows.

The ore occurs in contact metamorphic deposits of altered limestone and as disseminated or "porphyry" ore in the adjacent intruded mass of monzonite porphyry. The contact deposits have been the main source of ore supply thus far. These deposits have been cut and displaced by faulting and shearing, orebodies occurring as irregular contact lenses having a N.-W. strike, with axes parallel to the fault and fissure planes. The oxidized zone is comparatively shallow, being not deeper than 150' in the principal workings, with a sharp change from the oxidized to the sulphide zone. The oxidized ores, which contain cuprite, malachite and azurite, furnished the bulk of early production, but the principal ore mineral of the deposit is chalcopyrite, with occasional bornite in a garnetiferous gangue. The contact deposit also shows some ore that is an argentiferous sulphide-complex of galena, sphalerite and chalcopyrite.

In 1909 the company acquired working control of 240 acres of adjoining lands, owned by El Tiro Copper Co., and considerable churn-drill boring has been done, showing an extensive deposit of disseminated sulphides in monzonite-porphyry averaging 2.3% copper.

The original workings were those of the Mammoth or Old Boot mine opened in 1865, and a small producer of high-grade copper and silver-lead ores at irregular intervals, under former ownership. This mine has been the principal producer of the property, the ore coming mainly from the 400', 500' and 600' levels. Development includes the 1,200' Page crosscut tunnel and the 800' Mammoth shaft of 3 compartments, vertical, replacing the old 400' Mammoth shaft sunk at 40° incline now used for ventilation, pump-columns and lowering timber. The 700' station has a

Prescott compound condensing pump raising about 200,000 gals. of water daily. The mine also has extensive open cuts from which ore has been extracted.

The Union shaft is 1,600' north of the Mammoth and connected with it on the 300' level. The shaft is 450' deep, developing an extensive body of smelting ore of 3 to 4% copper tenor, with reserves of low-grade garnetiferous ore of about 2% copper average.

The Billy shaft, 1,000' northwest of the Union, is 300' deep and there also are the 300' Wilson and 100' Prospector shafts. The property as a whole is reported to have about 11 miles of workings. Development to Sept. 30, 1910, when mine was closed down, aggregated 77,121' of drifting, 12,590' of raises and 5,362' sinking, or 95,073' in all, of which 15,733' were done in the year ending Sept. 30, 1910, in which period 8,920' of work was done in the Mammoth, 3,605' in the Union, 929' in the Billy and 168' in the Page mine.

The main power plant, at the Mammoth mine, has six 70-h. p. boilers, burning petroleum, with oil-storage tanks. There are three 200-h. p. hoists, 1 at the vertical and 1 at the incline shaft of the Mammoth. There is also a 60-h. p. double tandem drum gasoline hoist at the Billy mine. The Mammoth plant has a Nordberg 2-stage cross-compound condensing air compressor, with capacity of 3,000 cu. ft. of free air per minute, at 90 lbs. initial pressure, and there is a 5-drill Norwalk 2-stage straight-line air compressor at the Union mine, where there is a steam plant with six 70-h. p. boilers. Compressed air for the Porter locomotives is furnished by a Norwalk 3-stage straight-line air compressor, driven by a 40-h. p. 440-volt induction motor. Power for lighting, for compressor motor and for mill machinery, is generated by a 500-kw. Westinghouse turbo-generator, at the smelting plant at Sasco, and transmitted 12 miles by No. 6 wire to the mine at 11,000 volts, stepped down at 440 volts for use. The Mammoth shaft has a 36" Link-Belt picking belt, of 120' length, for sorting ore.

The 300-ton mill, said to have cost \$165,000, went into commission Sept., 1908, and was being operated at full capacity just before production was suspended, Aug., 1910. The mill was planned to handle porphyry ores and such ferruginous copper ores as would require concentration before use as fluxing ore in the smelter. Equipment includes three 16x36" rolls, 6 New Century jigs, 22 Card tables and 20 vanners. The mill is operated by electric motors of 5 to 50 h. p. There also is an old 20x40' experimental mill, of 10 tons daily capacity.

Buildings include machine shops, carpenter shop, a framing mill, smithy, bunkhouses, boarding houses, changing houses and about 20 dwellings, with a mine store, carrying a large stock.

The Southern Arizona railway, controlled through stock ownership by this company, is 22 miles long, of standard gauge, running from Silver Bell through Sasco to Red Rock, connecting with the Southern Pacific line. Equipment includes 3 locomotives and 25 cars. At the mine, ore is hauled in by Porter compressed air locomotive to a 100-ton shipping bin at the railroad track and taken in 50-ton steel bottom-dump cars to the Sasco smelter.

Smelting operations began Oct. 1, 1909, and continued to Aug. 15, 1910, or 10½ months, in which time the plant handled 241,410 tons of ore, including 3,511 tons of custom ore. The average cost of smelting including taxes and depreciation was \$2,405 per ton and of mining \$2.137. The net average price received for copper was 12.91 cts. per pound.

Production has been as follows:

	Tons Ore.	Copper, Lbs.	Silver, Oz.
Sept. 1, 1904, to Dec. 31, 1904.....	13,695	3,030,632	21,525
Calendar year, 1905.....	34,313	5,687,152	39,399
Calendar year, 1906.....	36,059	4,385,246	44,327
Calendar year, 1907.....	41,456	5,267,401	63,171
Jan. 1 to Sept. 30.....	69,651	5,699,008	80,970
Oct. 1, 1908, to Sept. 30, 1909.....	242,400	10,500,000	140,000
Oct., 1909, to Sept. 30, 1910.....	237,118	11,215,170	119,355
Total	674,692	45,784,609	508,747

IMPERIAL COPPER CO.

SOUTH DAKOTA

Durbin Groupe, pres.; John O'Brien, supt. Property in Custer Peak district, developed by 175' shaft, reaching permanent water level. Cross-cutting will be done to open up the 30' ledge, and machinery, including a steam hoist and pump, are being installed. Mine reported to show good values in copper in upper workings.

IMPERIAL COPPER & GOLD MINING CO.

WYOMING

Office: 423 Caswell Block, Milwaukee, Wis. Jacob Best, sec.-treas. Lands, 133 acres, patented, near the Portland mine, on Upper Cow creek, 12 miles west of Encampment, showing 2 veins, 1 of 26 to 32' estimated width, being a schist dike. Mine has about 500' of tunnels developing ore giving assays of 6 to 14% copper, with small gold and silver values. Secretary reports all taxes paid, 1913.

IMPERIAL MINE.

UTAH

Leased by J. H. Manderfield, N. S. Nielson and Walter James, Newhouse, Beaver Co., Utah. Claims, near the old Cactus mine, show a strong vein on a contact between quartzite and granite (or monzonite), carrying shoots of high-grade copper ore with gold and silver values.

Development is by a 1,300' tunnel in monzonite with some 3% chalcopryrite ore; also the older 300' Massachusetts tunnel in decomposed quartzite and granite. A third 250' tunnel on the opposite side of the mountain shows a strong vein on which recent work has developed chalcopryrite ore from which shipments carrying 14% copper were made in 1911. Work resumed in 1912 and compressor and other machinery installed.

IMPERIAL MINING CO.

IDAHO

Mine office: Burke, Shoshone Co., Idaho. Eugene R. Day and O'to A. Olsson, directors. John H. Nordquist, gen. mgr. Organized 1906, capitalization \$1,000,000, shares \$1 par. Assessment of 1½ mills per share levied 1913. Property adjoins the Copper King, on the west. Developed by over a mile of work in upper and lower tunnels and is now preparing to explore property by diamond drilling.

IMPERIAL MINING CO.

WASHINGTON

Probably dead. Letters unanswered from Marysville, Wash. Mine at Silverton, Snohomish Co., Wash. Jas. E. Dupree, president. Lands, 11 claims; showing a contact vein between diorite and conglomerate, carrying gold, silver, copper and lead ores.

INCA MINING & MILLING CO.

IDAHO

Idle and probably dead. Letter unclaimed at Cuprum, Washington Co., Idaho. Owns the Mineral World mine in the Seven Devils district, carrying auriferous and argentiferous lead and copper ores.

INDE REDUCTION CO.

MEXICO

Idle. Letters to Oil City, Pa., and Indé, Durango, Mex., unanswered. W. J. Hulings, pres.; Marcus Hulings, mgr. Is apparently no connection of the Indé Gold Mining Co. Lands, near Rosario, the nearest rail point,

include Las Coloradas and La Cruz mines, also the Mina Matracal, bought Feb. 1, 1909. The Matracal has a vein of 7 to 15 meters width, traceable 800 meters, carrying gold and copper with excess of iron, and copper and lead sulphides. La Roca smelter has 2 furnaces of 200 tons daily capacity, doing a general custom business, making matte carrying 18 to 30% copper, 10 to 15 kgs. silver and 150 to 175 grams gold per metric ton, shipped to the Aguascalientes smelter for conversion and refining.

INDEPENDENCE COPPER & GOLD MINING CO.

UTAH

Probably idle. Letters to Salt Lake City, Utah, unanswered. Mine office: Alta, Salt Lake Co., Utah. Chas. Parks, pres.; Fred Carlson, vice-pres. and treas.; E. O. Leatherwood, sec.; E. R. Morgan, gen. mgr., at last accounts. Organized 1904, under laws of Utah, capitalization \$50,000, shares 10 cts. par. Lands, 11 claims, 2 patented, 16 miles from Sandy the nearest rail point. Mine has about 200' of tunnels, showing copper and gold values with a little lead.

INDEPENDENCE GOLD & COPPER MINING CO.

MONTANA

Office and mine: Deer Lodge, Powell Co., Mont. I. S. Eldred, pres. and gen. mgr.; Peter Pauley, vice-pres.; E. Scharnikow, sec.; W. F. Gullette, treas.; preceding officers, A. D. Hoss and W. C. Spottswood directors. Organized 1907, under laws of Montana, capitalization \$900,000, shares \$1 par. Assessments to date 10 mills per share. Lands, 120 acres in the Oro Fino district, 12 miles south of Deer Lodge and 5 miles south of 2 railways. Property includes the old Independence mine located 1870, which is a patented tract of 102x2,200', formerly having a 50' shaft and a 340' tunnel. New workings include shafts of 25', 35' and 125', and tunnels of 30' and 55', showing a vein of 4 to 5' width, carrying copper ore said to have averaged as produced about \$12 per ton in combined values, and to be capable of concentration 4 into 1, giving concentrates with excess of iron. Closed down Sept., 1908, for lack of funds. Leased until Jan., 1914, to men who are driving old tunnel and mining some gray copper ore carrying \$18 in gold and copper.

INDEPENDENCE MINING CO.

WYOMING

Idle. Office: 55 High St., Oshkosh, Wis. E. E. Meeleus, pres.; Henry L. Larsen, vice-pres.; H. O. Granberg, sec.-treas. and gen. mgr. Organized June 28, 1904, under laws of Wyoming, capitalization \$1,000,000, shares \$1 par, as successor of Leighton-Gentry Mining Co.

Lands, 6 claims, patented, 120 acres 2 miles north of Dillon in the Battle Lake district, showing eruptive metamorphic country rocks, carrying an 11' contact vein between quartzite and diorite, opened by a 200' incline shaft and 250' tunnel, showing occasional stringers of 3 to 12" width, carrying a little chalcopryite assaying 12% copper, with small quantities of nickel and cobalt and traces of silver and gold. Has steam power, a hoist and several small mine buildings. Taxes paid to date.

INDEPENDENT COPPER MINING & MILLING CO.

IDAHO

Jas. Bean, pres.; Mullan, Idaho; John H. Nordquist, vice-pres., gen. mgr. and agt., Wallace, Idaho; C. D. Miller, sec.-treas.; preceding officers, Forest Clark and Henry Bilberg, directors. Organized 1907, under laws of Idaho, capitalization \$1,250,000, shares \$1 par; issued \$950,000; assessment to date 1½ cts. per share.

Property, 3 claims, the Bullpen, San Quentin and Independent Fraction, in the Snowstorm copper belt, 3½ miles northeast of Mullan in the Hunter mining district, Shoshone county, Idaho. Claims show quartzite cut by 4' fissure vein running N. 72° W., dip 80° S., the vein underground being 10' wide and carrying scattered bunches of 2% copper ore. Development includes 800' crosscut tunnel, with 300' or more of drifts at a depth

of 300' below the outcrop. Development to date, 1,300', shows ore in various places but not in commercial amount. Property inactive since 1908, but reopened 1913. Equipment includes 100-h. p. electric motor, etc.

INDEPENDENT MINE.

NEW MEXICO

Cooke & Gunn, owners, care the Oaks Co., Alma, N. M. Property in Copper creek, Mogollon district, shows a rhyolite andesite contact netted by mineralized fractures carrying gold and copper values. Developed by 250' tunnel.

INDEX-BORNITE COPPER MINING CO.

WASHINGTON

Idle. Letter unclaimed at 36 Dexter Horton Bldg., Seattle, Wash. Mine at Index, Snohomish Co., Wash. A. M. Watt, sec.-treas. and gen. mgr., at last accounts. Lands, 2 claims, 40 acres, 3 miles east of Index, having a 50' shaft, and tunnels of 70' and 300', the latter a lower crosscut tunnel having a 200' back on a 2 to 4' vein, with a pay streak carrying argentiferous bornite assaying 16 to 50% copper and 6 to 8 oz. silver per ton.

INDEX MINING CO.

WASHINGTON

Probably dead. Letters unanswered from Snohomish, Wash. Mine at Index, Snohomish Co., Wash. Lot Wilbur, pres. and gen. mgr., at last accounts. Lands, 5 claims, known as the Miller group, opened by tunnels of 300' and 800', showing chalcocite, bornite and chalcopyrite in a 12' vein of concentrating ore carrying a 2' pay streak of smelting ore on the foot-wall.

INDIAN FALLS DEVELOPMENT CO.

CALIFORNIA

Office: 754 St. Helena Ave., Tacoma, Wash. Mine office: Indian Falls, Plumas Co., Cal. C. A. Darmer, pres.; A. Holt, vice-pres.; Horace W. Tyler, sec.; O. B. Roeder, treas., all of Tacoma, Wash., and John Arthur, directors; G. H. Goodhue, gen. mgr. and cons. engr. Organized May, 1908, under laws of Washington, capitalization \$2,000,000, shares \$1 par, non-assessable; issued, \$1,860,000. Annual meeting, July 12 each year.

Lands, 21 claims, 7 patented, 9 in process of patenting, 440 acres, also 188 acres of miscellaneous lands including the townsite of Indian Falls, in the Shoo-fly district. Property shows talcose schists, slate and porphyrite, carrying 8 lenticular bedded veins, in schists, with average strike of N. 30° W. and dip of 50 to 70°. Six veins under development are reported as averaging 4', 8', 12' and 30' in width, traceable 12,000', carrying chalcopyrite associated with pyrite, estimated by management to average 2½% copper, 1.8 oz. silver and \$1.06 gold per ton. Development is exclusively by tunnels, 8 short and one 587' long, with 1,315' of workings, estimated by management to show 21,000 tons of ore, with 16,000 tons blocked out for stoping.

Management plans erecting a summer resort hotel and development of the mineral springs and townsite.

INDIAN QUEEN CONSOLIDATED MINING CO.

UTAH

Idle. Address: care Jesse Knight, president, Provo, Utah. Mine near Newhouse, Beaver Co., Utah. L. N. Morrison, vice-pres.; R. E. Allen, sec.-treas.; David Evans, mgr.; Jas. Quinn, supt., at last accounts. Organized 1907, under laws of Utah, capitalization \$150,000, shares 10 cts. par, fully issued. Shares are listed on the Salt Lake Stock Exchange.

Lands, 25 claims, partly patented, near the King David mine about 2 miles east of Newhouse, taken over from the old Indian Queen and Leland companies. Development is by a shaft and a 4,700' tunnel planned to be driven 6,000', showing at 1,500' from the portal a mineralized fissure that was drifted on for 500', but gave no ore. Equipment includes electric

power, with a hoist and air compressor. Closed down July, 1910, and worked by leasers, with small production of picked ore, until July, 1912.

INDIAN QUEEN MINING & SMELTING CO. MONTANA

Idle since 1908. Office: 22 West Park St., Butte, Mont. Mine office: Apex, Beaverhead Co., Mont. Thos. F. Stephens, pres., treas. and gen. mgr.; Wm. Robertson, vice-pres.; Thos. W. Ellis, sec.; A. H. Stephens and T. J. Ellis, directors. Organized July, 1904, under laws of Montana, capitalization \$450,000, shares \$1.50 par, nonassessable; issued, \$228,000.

Lands are 2 claims, 40 acres, and a 3-acre mill site, in the Utopia district, known as the Indian Queen mine, which is owned jointly by this company and the Anaconda Copper Mining Co. The property shows granite, quartzite and dolomite, having 2 contact deposits between granite and limestone, of 8 to 10' average width, carrying malachite, azurite and chalcocite, estimated by management to average 8% copper, 10 to 12 oz. silver and \$1 to \$4 gold per ton. Mine was opened 1867, and has been worked intermittently by lessees. Development by shafts of 150' and 220', and 820' tunnel, with about 1,600' of workings.

Equipment includes about 60 h. p. in steam and gasoline, with a hoist good for 500' depth. There is a small smelter, connected with the shaft by a short tramway, having a 30-ton 36" circular water-jacket blast furnace producing matte averaging 55% copper, 27 oz. silver and 0.13 oz. gold per ton. Production, 1903, was 1,400,000 lbs. fine copper.

INDIAN SPRINGS MINING CO. NEVADA

Address: 223 Mohawk Block, Spokane, Wash. Mine at Lida, Esmeralda Co., Nev. A. B. Railton, pres.; H. T. DeMerritt, vice-pres.; Fred N. Davis, sec.; Thos. R. L. Harris, treas.; Ross C. Craddock, supt., at last accounts. Organized Feb., 1911, in Washington, capitalization \$1,500,000, shares \$1 par, assessments, 3 mills to April, 1913. Company is a reorganization of the Indian Springs Copper Mining Co., with new directorate.

Company owns 8 claims, 100 acres mineral land in Lida valley, or Tule Canyon district, 30 miles southwest of Goldfield, Nev. Ground shows veins and replacements in massive gray limestone. Vein runs east-west, has vertical dip and is said to be 70' wide, traceable for 1,000'. Development by 100' shaft and 200' tunnel. Has steam power and expects to continue work with a small force, 1913-14.

INDIANA-DARRINGTON MINING CO. WASHINGTON

Probably dead. Letters unclaimed at Seattle, Wash. Mine said to be at Darrington, Snohomish Co., Wash. G. A. Rochester, pres.; Geo. M. Crawford, sec., at last accounts. Capitalization \$1,000,000, shares \$1 par.

INDIANA MINING CO. MICHIGAN

Office: 60 Congress St., Boston, Mass. Mine office: Dee Bldg., Houghton, Mich. R. M. Edwards, pres. and gen. mgr.; Henry Tolman, treas.; Chas. G. Rice, Sidney J. Jennings and A. F. Holden, directors; Albert L. Wyman, sec.; Thomas Bennetts, supt.; Wm. Wearne, mg. capt. Organized Aug. 11, 1909, under laws of Michigan, capitalization \$2,500,000, shares \$25 par; issued, \$2,000,000, paid in, \$10.50. Company gave 60,000 shares to owners of lands for its property and offered 36,000 shares, Aug., 1909, for public subscription, and is supposed to have started business with \$128,000 cash. Expenditures, 1912, totaled \$77,917, and quick assets at end of year were \$65,144, with accounts payable \$12,084.

Lands, 1,200 acres, bought 1909 from the Indiana Copper Co., the tract lying northeast of the Lake and north of the North Lake, in Secs. 21, 27 and 28, T. 50 N., R. 37 W. The property was worked on a small scale previous to the burning of its mill, 1864, but the old openings are inaccessible and no work has been done thereon by the present company. The

lands are heavily timbered and can supply all mining timber for a considerable time. Ample water is available from the Fire Steel river. Transportation is furnished by a spur of the Copper Range railway, and the Mineral Range line is within a short distance.

The lands are traversed by the Evergreen belt of copper-bearing amygdaloidal beds and by a number of unidentified cupriferous beds lying between the Evergreen belt and the eastern sandstone. The southeastern part of the tract is in the hypothetical horizon of the Lake amygdaloidal bed. The Indiana is covered with a heavy overburden of sand, hampering drilling operations. The ground has been tested by extensive diamond-drill borings.

No. 2 drill hole resulted in the disclosure of phenomenally rich copper ground, the core being taken from a bed lying immediately under a 400' conglomerate. The nature of this bed is a subject of dispute, it having been called sandstone, conglomerate and felsite, but there is little question that it is an altered felsite. A microscopic analysis made of No. 2 drill core by Mr. R. C. Allen, state geologist of Michigan, shows the rock to be holocrystalline, extremely fine-grained, with a rather confused texture, the individual grains interlocking and overlapping very irregularly. The rock consists essentially of quartz and light colored mica, with secondary infiltrations of calcite and small irregular grains of disseminated native copper. Secondary quartz, clear and normal, occurs in small ramifying veinlets. Mica seems present in 2 types, 1 with extremely small and irregular flakes and the other in irregular crystals of much larger size. The even size of the quartz grains, with their interlocking texture, indicates an igneous origin. There are indications that the 40' of rich felsite rock and a second zone of about 25' width, are parts of a single bed of approximately 265' width, the second zone of 25' being near the center of the wide bed. No. 5 hole, drilled in felsite, at a depth of about 400' in the horizon of the felsite cut in No. 2, the discovery hole, and No. 9 hole, cut felsite carrying heavy copper at a depth of 1,497', apparently a continuation of the same orebody.

Ground was broken, Jan., 1911, near No. 2, the discovery hole, for a vertical shaft, the overburden at this point being about 110'. The shaft is cylindrical, of 17' outside diameter, lined with steel and concrete, with inner dimensions of 8x12', and was 1,400' deep, Aug., 1913, with a good showing of heavy copper along the contact between felsite and trap rock on the 600' level.

Equipment includes a steam hoist good for 2,500' depth, air compressor, and necessary mine buildings.

INDIANA MINING CO.

Bankrupt. Property near Baker City, Ore. Closed down. Was a reorganization of Hoosier Boy Co. Described Vol. X.

INDIANA-SONORA COPPER & MINING CO.

Dead. Formerly owner of entire capital stock of Sierra de Cobre Mining Co., S. A., which see. All properties transferred to subsidiary companies of Greene Cananea Copper Co.

INDICATOR MINING CO.

T. F. Gleeson, pres.; D. C. McLean, vice-pres., both of Salt Lake; C. N. Needham, sec.-treas., Thistle, Utah; P. McCaffery and J. J. Gertster, directors, at last accounts. Organized 1911. Property consists of 8 claims, 160 acres, on Dutch mountain, about 30 miles from Wendover. Claims show a 4' fissure vein of white quartz carrying 5% copper with low silver and gold values, according to H. J. Earnest, the consulting engineer.

OREGON

MEXICO

UTAH

INGENIKA FINLAY RIVER DEV. CO.**BRITISH COLUMBIA**

Idle. Mine address: Jedway, Moresby island, Queen Charlotte Group, B. C. Lands, near Ikeda bay, at the southern end of Moresby island, include the Copper Cliff group, carrying a vein of 20' estimated average width, traceable some 300'. Property, but slightly developed, has ore assaying 9 to 11% copper, with fair gold and silver values. Closed down since 1911.

INGOMAR CONSOLIDATED GOLD MINING CO.**CALIFORNIA**

Office: 954 Phelan Bldg., San Francisco, Cal. George D. Graves, superintendent, Campo Seco, Calaveras Co., Cal.

Property, the Ingomar mine, worked in the 50's as a gold mine. Claims show fissure vein with gold-bearing copper ore. Development by shaft, 300', with level at 120' showing orebody 60' wide of \$12 to \$50 ore. Equipment includes steam hoist and a 10-stamp gold mill, employing 25 men at mine and mill.

INGUARÁN; COMPAGNIE D'.**MEXICO**

Office: 56 Rue de Provence, Paris, France. Mine office: Inguarán, Ario, Michoacán, Mex. Ch. Laforgue, gen. mgr.; Maurice Armand de Lille, agt.; J. L. Philips, supt. Organized Jan. 15, 1898, under laws of France, capitalization 12,000,000 francs, shares 500 francs par. Is controlled jointly by the French house of Rothschild and the Banque Mirabaud; a considerable portion of the company's stock is owned by the Compagnie du Boleo. Property is said to have cost 1,500,000 pesos, and company reported to have expended about \$8,000,000 thereon, which is undoubtedly overestimated.

Property, 185 hectares, and a mineral zone of 5,000 additional hectares, in the Tacambaro district 70 miles north of the Balsas river, Michoacán, lying on the plateau of the volcano Jorullo, 1,500' above the plains. The Inguaran mountain is traversed by a dike 2,000 to 3,000' wide, of fine-grained pink granite, or granodiorite sprinkled with grains of copper glance and copper pyrite. This dike is traceable several miles across country. The granitic rock is sprinkled with specks of chalcocite and chalcopyrite forming a disseminated, or so-called porphyry deposit whose payable ores occur in belts or bands in the dike. Proven depth of the ore is about 300 meters, at which point it apparently cuts off. Development is by a 2,500' tunnel and 2 main shafts, deepest 350', with levels opened at 80' intervals. Both ore and country rock are exceedingly firm, little timbering being required. Estimates of size and value of the orebodies vary greatly, but the best authorities estimate an average of 3.25% copper, with 2,000,000 to 3,000,000 metric tons of ore blocked out. The ore is not well adapted to wet concentration as the metallic sulphides are firmly interlocked with the granitic minerals, but the ore is admirably adapted to treatment by froth flotation of the Minerals Separation Co., and apparently could be put about 8 or 10 into 1.

The mine has steam power and a 200-h. p. hydro-electric installation at Mata de Plantano, 7 miles from the mine, where there is a stream flowing about 80 liters per second, with an available head of 930', fed by springs that burst forth from the foot of Mt. Jorullo after the last eruption of that volcano, about 1750.

A survey has been made for a railway from Patzcuaro, the present shipping point, to Inguarán, a distance of 78 miles. A complete survey has also been made and plans drawn for a railway from the mines to Zihuatanejo, on the Pacific, the route of the proposed line traversing a rugged country that would necessitate several years for construction.

The Inguarán was the particular bugaboo of the copper situation at the end of the nineteenth century, the exigencies of the trade demanding that there always be some mine, just about to begin production, that can make

several hundred million pounds of copper yearly at a merely nominal cost. The Inguarán has a large body of low-grade ore, but it is not equal in quantity or quality to that of several of our other "porphyry" coppers.

The only recorded production was 598,439 lbs. of ore, valued at 21,870 pesos, shipped 1904, doubtless for test purposes. The property has been idle some years and cannot become a serious producer until rail connections are secured; judging from the very leisurely progress of the past decade it will become a large producer about the time that Gabriel blows his horn.

INLAND COPPER CO.

ARIZONA

Idle. Letters to 1017 Commerce Bldg., Kansas City, Mo., and to the mine at Planet, Yuma Co., Ariz., unanswered. L. E. Corbin, pres.; A. W. Bork, vice-pres.; S. D. Dodson, sec.-treas. Organized under laws of Arizona, capitalization \$5,000,000, shares \$1 par, nonassessable. Lands, 40 claims, including 2 groups of about 15 claims each, in the Bill Williams range, near the Bill Williams Fork river, with a mill site, smelter site and water rights. The mine has 2 tunnels, presumably short, and a 2-compartment shaft of 150', planned to be sunk to 250', equipped with an 18-h. p. gasoline hoist. There are several mine buildings. Company advertised for copper ores, presumably to show its stockholders, since it had no reduction plant of its own. Is not regarded favorably.

INLAND COPPER CO.

IDAHO

Idle. Letters unanswered. Mine near Troy, Latah Co., Idaho. Owns the Inland Empire mine, with 8 claims, 6 miles east of Troy. Development by tunnels aggregating about 1,000', showing at depth of 160' a vein of 20' estimated width, carrying mainly oxidized ores, with rich streaks assaying up to 27% copper. Company was said, early 1909, to plan shipping 12 carloads of ore, then blocked out, to the Tacoma smelter, but apparently failed to do so and has been quietly sleeping since that time.

INLAND MINING CO.

MONTANA

Idle. Letter unclaimed at Wallace, Idaho. Mine near Taft, Missoula Co., Mont. Barney Swanson, pres. and gen. mgr.; John H. Nordquist, cons. engr. Lands, 10 claims, well timbered, in Dennemora gulch, 3 miles southeast of the Dennemora mine, about 5 miles from Saltese, having a 3 to 10' vein with east-west strike, carrying chalcopryite and averaging 3 to 10% copper, with smaller gold and silver values. Development is by a 300' upper crosscut tunnel, a 100' middle tunnel and a 700' lower crosscut tunnel.

INSPIRATION CONSOLIDATED COPPER CO.

ARIZONA

Office: 42 Broadway, New York. Mine at Miami, Ariz. William B. Thompson, pres.; William D. Thornton, vice-pres.; Joseph W. Allen, sec.-treas.; Evan J. Dudley, asst. sec.; Charles E. Mills, gen. mgr.; preceding officers, John F. Alvord, Thomas F. Cole, Edmund C. Converse, William E. Corey, Charles A. Corliss, Philip L. Foster, Henry B. Hovland, Eugene Meyer, Jr., William G. Rockefeller, John D. Ryan, Charles H. Sabin and Albert H. Wiggin, directors. F. H. Vollstedt, purch. agt. Guaranty Trust Co., New York and Old Colony Trust Co., Boston, transfer agts.; Bankers Trust Co., New York and the National Shawmut Bank, Boston, registrars. Organized Dec. 18, 1911, under laws of Maine, capitalization \$30,000,000, shares \$20 par; issued, 722,943 shares. Bonds \$6,000,000, 10-year, convertible 6%, due March 1, 1922, convertible into stock at \$25 per share.

The annual report of Dec. 31, 1912, showed cash on hand and accounts receivable of \$4,521,381, with liabilities of \$137,435, which should be ample for its mill construction and development expenditures.

Company took over properties owned by the Inspiration Copper Co.

and the Live Oak Development Co., paying for same in stock. In May, 1912, the mill and camp site of the Black Warrior copper mine was purchased from the Warrior Copper Co. for \$175,000.

The Inspiration group embraces 40 claims, patented, 546 acres, in a compact tract having an extremely irregular outline, next west of the Miami and north of the Keystone, 8 to 10 miles west of Globe. Company also owns the Live Oak group west of the Keystone property and a 160-acre ranch, with valuable water rights covering the junctions of Pinal and Miami creeks.

The property carries about $1\frac{1}{2}$ miles of the strike of a mineralized belt of Pinal schist, much crushed, altered and silicified by contact action, due to the intrusion of the great mass of granite forming the hills to the S. W., the shattering having allowed the free circulation of secondarily enriching solutions. The oxidized zone shows carbonates, occasionally of commercial tenor, as in the Clipper tunnel, but ore occurs mainly in secondary form as disseminated chalcocite, forming an enriched zone of commercial ore of 50 to 575' in thickness, estimated by the management to average 180', with an average of 90 to 100' of overburden, underlaid by a primary zone of cupriferous pyrite below commercial tenor. About 40% of the values occur in small fissures and veinlets and along the jointing planes and planes of schistosity, copper being mainly in the form of flakes and grains of chalcocite, the balance of about 60% of ore values being disseminated through the gangue of friable Pinal schist, with some quartz. The mineralization also extends into the granite-porphry contact, about 10 to 15% of the ore developed in the Colorado orebody being in granite. The cupriferous schist is faulted, just east of the Woodson orebody, by the Bulldog fault zone, of about 300' width.

Development under the present company has been of a dual nature, including both extensive underground openings, along lines somewhat similar to those used in opening the adjoining Miami mine, and extensive churn-drill borings along the same general system as followed in the development of the Ray and Chino mines. On Dec. 31, 1912, this mine and the Live Oak together had 71,846' of workings, and 229 churn-drill holes. By the various shafts and workings and by drill holes bored from surface, the ground has been proven for a maximum width of 1,400' and length of 3,400', and Dec. 20, 1911, this area was estimated to have an average thickness of 354' of capping, with average thickness of 142' of commercial ore containing 30,300,000 tons of 1.95% copper ore.

The Live Oak group of 14 claims, 200 acres, is about $1\frac{1}{2}$ miles west of Miami at the western end of the Miami ore belt and separated from the Inspiration group by the property of the New Keystone Copper Co. The geological conditions are similar to those of the Miami belt generally, save that much of the surface is covered by leached white granite, showing brilliant, green-stained outcrops of far more attractive appearance than any other part of the belt. This granite is underlain by schists carrying the ore, but part of the orebody is in granite.

The mine was originally opened on a flat dipping vein, 5 to 12' thick, carrying high-grade chrysocolla ore, from which shipments running 17 and 18% were made for several years. Much of this material is quartzose and valuable as a gemstone. The vein ended at water level in a mass of low-grade chalcocite ore similar to that of the Miami mine. This orebody was developed by tunnel work and drilling by the Live Oak Development Co. by over 50 drill holes with 20,000' of drilling and 5,000' of new underground work. This work blocked out a body of disseminated ore 1,400' long, 75 to 200' deep beneath a capping of oxidized material averaging

435' thick. The orebody as developed averages 114' thick and carries 15,000,000 tons of 2.11% copper ore.

The combined properties are being prepared for ore extraction and but little new development, save diamond drilling on the Live Oak is being done in 1913. At the present time there is about 15 miles of underground work with 229 drill holes, having 124,886' of work, blocking out 45,000,000 tons of 2% ore.

Development includes the churn drilling already mentioned and underground workings from various tunnels and shafts. Ore extraction will, however, be entirely confined to 2 cement and steel-lined shafts, 585' deep and 107' apart, in Webster gulch on the north side of the mountain, while men and supplies will be lowered and water pumped at the Incline, or Supply shaft on the opposite, or Miami side of the mountain. The Inspiration orebody will be worked by 2 main tramming levels at 326' and 450' in depth, respectively. About 16,000,000 tons will be mined above the first named, or 4th level, and 29,000,000 above the 450', or 6th level. The Live Oak orebody will be accessible through the Live Oak shafts, but all ore will be hauled through the main haulage tunnel, 6,600' long, connecting with the bottom level of the Inspiration shafts.

The ore will be mined by the so-called Ray system, or pillar-and-stall method, and carried in trains of 5-ton cars by air locomotives to the working shafts. These 2 shafts will be operated from the same hoist house, but will be entirely independent units, capable of handling 7,500 tons daily each in a 14-hour day. The ore will be hoisted in skips, passed through crushers and put in 25,000-ton storage bins. From these bins it will be carried over the company's $4\frac{1}{2}$ -mile railroad, with 3% grade, to the new mill at the old Black Warrior townsite. Mining costs are estimated at 85 cts. a ton.

The new mill, designed by H. K. Burch, will handle 7,500 tons daily by a combined wet concentration and froth flotation process of the Minerals Separation Co. A 600-ton unit of the latter company is now in course of erection. The entire mill is expected to be in operation in 1914, the contracts for the machinery having already been let.

In addition to the estimated ore reserves of 45,000,000 tons of 2% ore, there is 8,000,000 tons of 1.4% oxidized ore which will be available for leaching. The company estimates a recovery of 80% of the value in the concentrating ore and a production of copper at 9 cts. a lb. On this basis the orebodies should produce 1,170,000,000 lbs. of copper, which will produce, if the management's figures of 9-ct. cost and 14-ct. copper can be maintained, a net return of \$58,000,000. The company is in expert hands, is well managed and is already the sixth largest copper mine in the world in point of tonnage developed and the fifth largest in the United States. It should produce 60,000,000 lbs. of copper annually.

INSPIRATION COPPER CO.

ARIZONA

Office: 14 Wall St., New York. Frank W. Holmes, pres.; D. E. Thomas, vice-pres.; H. F. J. Knoblauch, sec.; H. E. Dodge, treas., and L. Timmerman, asst. treas. Organized Dec., 1908, under laws of Maine, capitalization \$10,000,000, shares \$10 par; fully issued. A former issue of 100,000 shares of 6% cumulative preferred stock was converted into common stock, Oct., 1910, when the balance of stock in the treasury was sold at \$10 per share. The charter provides that the number of directors shall be fixed by the stockholders, at not less than 5, nor more than 15. Annual meeting, first Monday in March. Company sold all of its properties and assets to the Inspiration Consolidated Copper Co. in March, 1912.

INSPIRATION EXTENSION COPPER CO.**ARIZONA**

William Evans, pres., 438 Broome St., New York. Anton Trojanovich, gen. mgr., Miami, Ariz.; John Kasser, vice-pres.; Fred Augustin, sec-treas.; preceding officers and Geo. Kingdon, directors; J. A. Thomas, mine supt. and engr. Organized Feb. 11, 1913, under laws of Delaware, capitalization \$1,000,000, shares \$5 par; \$80,000 issued. Annual meeting, Feb. 11.

Property, 9 claims, 145 acres, unpatented, in the Miami district, is surrounded by claims of the Inspiration Consolidated Copper Co., and underlain by schist, locally altered, that is said to show a large deposit of low-grade copper ore that will average 3%.

Development is by a shaft now being sunk, 90' deep Sept. 8, 1913, that has passed through schist into granite.

Equipment includes a 35-h. p. gasoline hoist good for 500', with various buildings; a compressor will be installed in the near future.

INSPIRATION MINING CO.**ARIZONA**

Mr. Richardson, manager, Dragoon station, S. P. R. R., Cochise Co., Ariz. Property, northeast of Dragoon, shows a copper deposit, under development 1913.

INSPIRATION NEEDLES COPPER CO.**ARIZONA**

D. R. Williamson, pres.; Frank Beston, vice-pres.; F. W. Hamm, sec-treas., and Geo. J. Stoneman, directors. Organized Jan., 1912, under laws of Arizona, capitalization \$500,000, shares \$5 par. Annual meeting, first Monday in February.

Property consists of several claims in the Needle hills, Miami district, Gila Co., Ariz. Development work thus far has been limited. No account of operations obtained. Property is in poor locality for ore.

INTERCOLONIAL COPPER CO.**NEW BRUNSWICK**

Idle. Office: 32 Tyler Bldg., Pawtucket, R. I. Mine office: Dorchester, Westmoreland Co., N. B. Darius L. Goff, pres.; T. J. Edwards, sec. Organized 1899, under laws of Arizona, and capitalization decreased, 1906, to \$2,000,000, shares \$5 par, in preferred and common shares, latter with restricted voting privileges.

Lands, 250 acres freehold and 1,100 acres held by leasehold from the Crown, show a blanket vein carrying carbonate and sulphide ores, claimed to average 3 to 4% copper, which is an overestimate. Has shafts of 40', 75' and 150', also a 1,500' drainage tunnel, with about 8,000' of underground workings.

Works include a 200-ton concentrator, leaching plant and electrolytic refinery, having 2 boilers, 4 engines, crusher, rolls, 15 tubular roasting furnaces, six 300-ton leaching vats and two 50-kw. dynamos. The electrolytic plant has 550 lead cathodes and 550 lead anodes, 22x33" each, giving a plating surface of 5,000 sq. ft., for the deposition of electrolytic copper. Plant also includes tanks for precipitation of metal on scrap iron. Reduction plant proved unsatisfactory after making about 50 tons fine copper.

INTERMOUNTAIN GOLD & COPPER MINING CO.**IDAHO**

Idle many years; probably dead. Mine near Pocatello, Bannock Co., Idaho. G. B. Rogers, pres.; Frank Ball, treas.; G. A. Clark, sec. Lands are the Lost Horse group, on the Ft. Hall Indian reservation, opened by a 50' shaft, said to be bottomed in good ore.

INTERMOUNTAIN MINING & INDUSTRIAL ASSN.**UTAH**

Idle. Office: Denver, Colo. Letter unclaimed at former mine office, Bingham Canyon, Salt Lake Co., Utah. John Chase, pres.; Col. Thos. B. Crawford, mgr., at last accounts. Company owns 350,000 shares of Rio Dolores Copper Co.

Owens the Mystic Shrine group, 10 claims, 3 patented, area 135 acres,

in Markham gulch, Bingham Canyon, Salt Lake Co., Utah. Claims said to show chalcopryrite and galena ore in vein varying from a few inches to 20' in width, giving assays of 6.5% copper, 18.8% lead, 10 oz. silver and \$2 gold per ton. The mine has 4 shafts, deepest 200', and 8 tunnels, longest 700', with about 3,500' of workings. Equipment is said to include an air compressor.

INTERNATIONAL CONSOLIDATED MINING CO.

UTAH

Probably closed down. Letter unclaimed at Alta, Salt Lake Co., Utah. F. C. Jenkins, manager. Organized 1909, under laws of Utah, capitalization \$1,000,000. Lands, 11 claims, in Big Cottonwood canyon, about 5 miles from Alta, having a 100' tunnel showing a streak of rich sulphide ore.

INTERNATIONAL COPPER

& GOLD CO.

COLORADO, MONTANA & MEXICO

Office: 1207 Fort Dearborn Bldg., Chicago, Ill. Organized 1899, under laws of Arizona, capitalization \$3,000,000, shares \$1 par. Apparently is a holding company only, controlling through stock ownership the Montana Copper & Gold Mining Co. and the Santa Fé Copper & Gold Mining Co., and in turn is controlled by Sonora Central Mines Co., under which title all affiliated properties are described.

INTERNATIONAL COPPER MINING CO.

MONTANA

Probably dead. Letter unclaimed at Libby, Lincoln Co., Mont. Lands, near Libby, Mont., have a short tunnel said to show an 8' vein of molybdenite. Company was said, Jan., 1910, to be installing machinery.

INTERNATIONAL COPPER ORE CO.

MEXICO

Office: 424 Scarritt Bldg., Kansas City, Mo. A. M. Conard, president, Nogales, Ariz. Mine office: Noria, Sonora, Mex. Is the Mexican operating corporation of the Sonora Copper Co. Regarded with much suspicion.

INTERNATIONAL GOLD & COPPER MINING CO.

MEXICO

Idle. Mine office: Guaynopa, Chihuahua, Mex. J. C. Peterson, president. Company took over the lands formerly held by the International Consolidated Smelting & Mining Co. and presumably is a reorganization. Lands, 254 hectares, known as the Utah mine, in Guaynopa canyon, claimed by former owners to have a 90' vein, with an 8 to 12" pay streak carrying high-grade chalcopryrite, assaying 5 to 8% copper, with good silver values. Mine has several short tunnels, longest apparently only 100'. Idle on account of revolution, but regarded unfavorably for other reasons.

INTERNATIONAL METALS SELLING CO.

UNITED STATES

Is a subsidiary of the United States Smelting, Refining & Mining Co. and is managed by Vogelstein & Co., 42 Broadway, New York.

INTERNATIONAL MINING CO.

MONTANA

Office: Bozeman, Gallatin Co., Mont. J. W. Wilcox, pres.; S. J. V. B. Henderson, vice-pres. and treas.; Samuel F. Walker, sec. and gen. mgr.; preceding officers, Harvey M. Farriss and A. Badgley, directors, all of Bozeman, Mont. Organized Oct. 2, 1902, under laws of Montana, capitalization \$600,000, shares \$100 par, fully paid and nonassessable. Lands, 12 claims, 240 acres, well timbered, in Springhill mining district, Gallatin county, Mont., showing gneiss, quartzite and shale, said to carry fissure and contact veins, opened by 380 to 1,800' tunnels and by 5 shafts of 80 to 800', showing sulphide ores.

Company now developing an ore shoot said to carry 26% lead, 8 oz. silver and \$8 to \$67 gold per ton and expects to ship this year. The Lone Star group adjoining the International is practically under same ownership.

INTERNATIONAL NICKEL CO. UNITED STATES & CANADA

General office: Constable Hook, Bayonne, N. J. Executive office: 43 Exchange Place, New York. Ambrose Monell, pres.; R. M. Thompson, chairman of board; J. L. Ashley, sec.-treas. Organized Sept. 12, 1912, succeeding International Nickel Co. and Colonial Nickel Co., the former absorbing the Canadian Copper Co., which owns the great nickel-copper mines and smelters of Sudbury, Canada. Company also absorbed the Orford Co., Anglo-American Iron Co., Vermillion Mining Co., the American Nickel Works, the Nickel Corporation of Great Britain, and the Société Minière Calédonienne.

The copper-nickel properties consist of mines with an estimated developed reserve of 20,000,000 tons, smelting plants at Copper Cliff, Canada, handling 3,500 tons daily, separating and refining plants at Constable Hook and Camden, N. J.

Capitalization \$62,000,000, of which \$12,000,000 is 6% preferred stock; shares \$100 par; issued, 38,026,427 common and 8,904,718 preferred. Bankers Trust Co., New York, transfer agent; New York Trust Co., New York, registrar. Dividends, 6% on preferred, and 2% Dec., 1912; 2½% March 1, 1913, 3% June, 2½% September, on common stock. A majority of the stock is held by a voting trust ending Sept. 6, 1917.

INTERNATIONAL SMELTING CO.**MEXICO**

Idle. Last address: Suaqui de Batuc, Ures, Sonora, Mex. J. V. Hammer, pres.; H. W. Tracey, sec.; C. T. Finley, treas. Organized 1905, capitalization \$1,000,000, shares \$1 par. Planned building a smelter, and promised dividends, but failed to carry out its promises. Is regarded with much suspicion.

INTERNATIONAL SM. & REF. CO.**N. J., UTAH & INDIANA**

Office: 42 Broadway, New York. General manager's office: Kearns Bldg., Salt Lake City, Utah. Smelter at Tooele, Utah. Refinery at Perth Amboy, N. J. John D. Ryan, pres.; Dennis Sheedy and W. D. Thornton, vice-presidents; preceding officers, Chas. F. Brooker, Chas. N. King, Thos. Morrison, Chas. H. Sabin, Chester A. Congdon, E. C. Converse, W. E. Corey, L. D. Ricketts and Thos. F. Cole, directors; J. W. Allen, sec.-treas.; William Wraith, gen. mgr.; E. S. Woodward, ore purch. agt.; O. M. Kucks, supt. Tooele plant of International Sm. & Ref. Co. at Tooele, Utah; A. Clayton Clark, supt. Raritan Copper Works, Perth Amboy, N. J.; Geo. P. Hulst, supt. International Lead Refining Co., East Chicago, Ind.

Organized Dec. 21, 1908, under laws of New Jersey, capitalization \$50,000,000, shares \$100 par; issued, \$10,000,000. Is controlled by the Cole-Ryan interests. Company owns the entire capital stock of the Raritan Copper Works, Raritan Terminal & Transportation Co., New Jersey Storage & Warehouse Co., Tooele Valley Railway Co., and International Lead Refining Co. Guaranty Trust Co., New York, and Old Colony Trust Co., Boston, transfer agents. Bankers Trust Co., New York, and American Trust Co., Boston, registrars. Shares are listed on the Boston Stock Exchange. Annual meeting, second Tuesday in June.

The balance sheet of Dec. 31, 1912, gave total assets of \$19,387,029, of which \$11,533,347 was in fixed assets and \$207,358 was cash on hand and in banks. Net income for year 1912, after deducting for depreciation, was \$1,106,047, compared with \$1,219,037 for the preceding year and the surplus for year, \$306,047.

Gross income for 1912 was \$4,537,390, of which \$4,423,398 was from treatment charges and profits on metals. Dividends were begun Aug. 1, 1909, on the basis of 1½% quarterly, increased 1910, to 2% quarterly.

Tooele smelter is 6½ miles from Tooele Junction on the main line

of the San Pedro, Los Angeles & Salt Lake railroad, where connection is made with the Tooele Valley railroad, and plants and yards cover one-half square mile. The receiving bins for ore, flux and fuel have 10,000 tons capacity, the ore going from bins to crushing and sampling plant by belt conveyors; the fuel to furnaces by electric tramming system.

Crushing and sampling 5-story building, 40x84', 2 complete sections using the Brunton system of sampling, contains 8 Blake type crushers, 9 to 12"x15 to 24" in size and 8 rolls, 12 to 15" wide and 26", 42" and 48" diameter. Each sampling section contains 4 Brunton sample cutters. In the copper plant the ore is crushed to three-eighths inch, conveyed from sample mill to roaster storage bins (5,000 tons capacity) by belt conveyor, thence to roaster feed hoppers by belt conveyor.

The McDougall roaster building contains 2 sections, each 64x162' and holding 32 furnaces. These furnaces are 16' in diameter, 18' high and have 6 hearths. Roaster gases pass through a 120x140' hopper bottomed brick dust chamber 30' high above hoppers, containing two 4' banks of wires; thence through brick flue 255' long to stack. The brick stack is 350' high and 25' inside diameter at the top. The reverberatory plant receives the calcine by electric tram system. It contains 5 coal-fired furnaces, Anaconda type, 1 with 19x90' hearth, 4 with 19x102' hearths. Each furnace is equipped with 750-h. p. waste-heat Stirling boiler. Gases go through a brick flue 1,360' long to stack.

The converter plant has 5 electric-driven stands for 96x150" shells and a 60-ton crane. Converter shells are lined with magnesite brick. Copper is cast in steel moulds by 30-ton crane. Slag is cast in beds and broken up and sent to the lead blast furnaces. Gases from plant go through a steel flue to a 50x126' brick bag house containing 960 31x1' 6" woolen bags. From the bag house the gas is discharged through a 150' stack 15' in diameter at the top.

The power house contains 2 Corliss engines direct-connected to 250-kw. 500-vdc. generators; 2 vertical triple-expansion engines direct-connected to 750-kva. 2,200-v. generators; 2 converter blowing engines, 15 lbs. air; 1 steam-driven 90-lb. air compressor; 1 electric-driven 90-lb. air compressor; 2 No. 10 Roots blowers, direct-connected to tandem compound Corliss engines; one 750-kw. Westinghouse-Parsons turbo-generator; and 2 Leblanc condensers and necessary auxiliaries. Condensing water is cooled in natural draft cooling tower. In addition to the waste-heat boilers, there are 3 hand-fired 350-h. p. Stirling boilers.

The lead plant contains blast furnaces, sinter plant and charge bins. There are 26 double steel bins with a capacity of 10,000 tons of ore and concentrate, receiving material from the crushing plant by belt conveyor. Fine concentrates and ores already sampled can be dumped direct. Charges for blast furnaces and sinter machines are weighed in scale hoppers and dropped into charge cars, going direct to furnaces, but sinter charges go by car to a hopper-feeding belt conveyor delivering to sintering machines.

The sinter plant contains 10 Dwight-Lloyd machines, 42x264", rated capacity 100 tons per day per machine. Sinter from machines goes to blast-furnace charge bins by standard railway cars.

The blast-furnace plant is a steel and concrete building with two 45x180" and two 60x180" furnaces whose daily capacity averages 250 tons of charge. Gases pass to brick bag house containing 1,440 bags, lead to drossing plant and the lead-copper matte to the converter plant. A slag settling furnace is being erected. The drossing plant has four 30-ton kettles and uses a Howard press.

Tooele Valley railway has 7 miles of main line; 1 locomotive, 6-wheel

switching type, 57 tons weight; 1 locomotive Mogul type, 60½ tons weight; 2 locomotives, Consolidation type, 96 tons; 30 steel hopper-bottom ore cars; 3 flat cars and 4 passenger coaches.

This plant has a fully-equipped assay office and laboratory, shops, weather observation department, emergency hospital, offices, etc.

Industrial equipment consists of four 18-ton and four 12-ton electric locomotives, with necessary slag trucks, matte trucks, calcine and coal cars. All buildings are of steel and concrete construction.

The details given above show how mechanically perfect the plant has been designed. The smelting practice of copper ores largely follows Anaconda methods. The sulphide fines are roasted with a certain amount of silicious ore added upon the fifth hearth of the roasters to heat the ore and keep the temperature at the right point. The ore is roasted down to .7% sulphur corresponding to a matte fall of 15 to 18 tons per day. The reverberatory slag, carrying 40 to 42% silica, is tapped at the back of the furnace and the matte, carrying 20 to 30% copper, conveyed in ladles to the converters. The converters, when operated only on day shift, are kept hot over night by filling them with cinders from the reverberatory furnaces. Silica is applied to the converter in lump ore, 2 boats to each 8-ton charge. The bag-house dust from the smelter fumes is removed by reversing the fan and direction of current, drawing the dust into the chamber beneath.

The completion of the Utah Metal Mining Co.'s 11,000' tunnel in 1913, gives direct connection with the Bingham mines.

The Raritan plant, at Perth Amboy, N. J., on New York harbor, completed 1899, and since enlarged repeatedly, is one of the largest and most modern electrolytic copper refineries in the world, employing 1,000 men and having a productive capacity at the end of 1912 of about 35,000,000 lbs. refined copper monthly.

The smelting department consists of one 200-ton, one 150-ton and one 100-ton furnaces for casting anodes, and two 225-ton, one 150-ton and two 100-ton furnaces for casting wire bars, ingots and cakes.

The electrolytic refinery includes 2 tank houses with their respective power houses, power consumption being about 7,000 kw. The department has special shears for trimming cathode sheets and Morrow loop machines for attaching copper lugs to the cathode starting-sheets.

Beginning in 1911, tank house No. 1 was entirely reconstructed, the old tanks being dismantled, copper buss bars and other equipment entirely removed and new tanks installed of a larger size, corresponding with those in No. 2 tank room. The Walker system was utilized and 200 additional tanks were installed, making 1,800 in all, which increased the capacity of the room from 13,000,000 to 22,000,000 lbs. per month. Four new electric traveling cranes were added, increasing the number to 8 cranes in all and larger buss bars were substituted of sufficient capacity to economically carry the increased current. The general arrangement and method of operation is very similar to that in No. 2 tank room. This room is 210x582'.

No. 1 power house, which furnishes power for No. 1 tank room, was also entirely remodeled, four 1,000-kw. Nordberg triple-expansion Corliss engines installed, which are expected to operate on an extremely low steam consumption. Allis-Chalmers barometric condensers were also installed. The engines are direct-connected to 1,000-kw. electrolytic generators, 2 being furnished by the General Electric Co. and 2 by the Crocker-Wheeler Co.

No. 2 tank house is 145x585', having concrete foundations, with steel frame and brick walls, special acid-proof Berlin brick being used for the basement floor. No. 2 tank house has 3 bays running lengthwise, with two

10-ton 3-motor Whiting cranes in each bay, equipped with special devices for handling an entire tankful of anodes or cathodes at 1 load. There are 3 electric circuits running lengthwise, 1 in each bay, each circuit of 396 tanks being handled from the power house by an electric generator. Current is 7,500 amperes, giving a current density of 20 amperes per sq. ft. The main conductor has a cross-sectional area of $12\frac{3}{4}$ ". There are 1,188 depositing tanks arranged in 108 nests of 11 cells each, with electrode arrangement on the Walker system.

The International Lead Refining Co., a subsidiary company, with an extensive plant located at 151st Street and McCook Avenue, East Chicago, Ind., has 64 acres of ground. Construction work started April 20, 1912, and plant was in operation Oct. 3, 1912. Plant comprises main refinery building 168x416', all steel and concrete, with 3 standard-gauge tracks entering the building. There are 2 crane runways running the full length of the building, with 3 traveling cranes. Brick office building is 128x36'. A men's change house, of brick, 36x70', is equipped with toilets, shower baths, steel lockers, and 1 room equipped as a dining room. Brick bag house 65' 6"x55' 10", is constructed of brick and concrete, divided into 4 compartments of 144 bags, 30'x18'.

Equipment consists of one 12,000-ton battery Parkes process, two 300-ton softeners, four 60-ton desilverizing kettles, one 300-ton refining furnace, and one 200-ton molding furnace. The bullion comes in on a high track, is charged into furnace with charging machine and flows by gravity through the plant. Lead is hand-molded and trucked into cars. Sampling is done in two 40-ton kettles and bullion pumped into softeners with centrifugal pump. Residues are worked up in three 30-ton reverberatory furnaces. There are two 40-ton blast furnaces, 1 for antimonial slag, and 1 for by-products and ores; 8 retort furnaces for treating zinc skim and two 5-ton cupels for treating high-grade retort metal.

Common lead is double refined by crystallization in kettles in the corrodng lead plant. Refining plant is in complete operation. All furnace gases except softeners and retorts are drawn through a sheet flue 700' long and passed through the bag house.

Power is supplied by the Northern Indiana Gas & Electric Co. Two waste-heat boilers supply steam for compressors and refinery. High-pressure air is supplied by centrifugal air compressor and air for blast furnaces is supplied by a Connersville blower. A 50,000-gal. tank elevated 50', and 100,000-gal. sump tank, waste running back into sump tank and pumped into the 50,000-gal. tank, the elevated tank being connected with the East Chicago Water Co.'s mains. Oil storage capacity, two 12,000-gal oil tanks.

The International is not burdened by old smelteries acquired at exorbitant prices, but has new and up-to-date plants, capable of handling ore as cheap, if not cheaper, than any of its competitors and is already a big factor in the mining world. It is in strong and competent hands, both technical and financial, and its profitable operation is assured.

INTERSTATE EXPLORATION CO.

ARIZONA

Office: Room 202, Endicott Bldg., St. Paul, Minn. Maj. E. L. De Lestry, manager. Property comprises copper claims near Globe, Ariz. and lead-zinc lands at Benton and Platteville, Wis., and Galena, Ill. No returns secured.

INTERSTATE SILVER-LEAD MINING CO.

IDAHO

Merged with the Callahan Mining Co. in 1912 as the Interstate Callahan Consolidated. Is a silver-lead producer, some gray copper ore occurring in a quartz vein on the property, but not in commercial quantity. Property

gives promise of becoming one of the large lead-zinc producers of the Coeur d'Alene region.

INVESTMENT MINING & MILLING CO.

ARIZONA

O. A. Pease, pres. and gen. mgr., Goldzona, Yavapai Co., Ariz. Property, 1,400 acres, situated a few miles from Goldzona, shows veins carrying a paystreak of high-grade gold-copper ore and much low-grade ore. Development claimed in press reports to block out \$500,000 worth of ore.

INYO COPPER MINES CORPORATION.

CALIFORNIA

Office: 215 Balboa Bldg., San Francisco Cal. Mine address: Keeler, Inyo Co., Cal. R. G. Paddock, pres. and gen. mgr.; F. J. O'Dea, sec. Organized Nov. 19, 1910, under laws of California, capitalization \$1,000,000, shares \$1 par, assessable; issued, 550,000. Levied an assessment to pay for patenting claims, 1911.

Company is a reorganization of the Inyo Copper Mines & Smelters Co. The president states that it is free of debt but is waiting for better financial conditions before attempting to raise money and that at present only a small amount of work is being done, 1913.

Property consists of 19 claims in Ubehebe district, covering a contact zone between limestone and granite porphyry. For a mile this contact is said to show places where there is 1 to 20' of ore carrying 8 to 40% copper. The steep mountain side permits development by tunnel and future work will be of this character. Former development, amounting to 650', includes 6 shallow prospect shafts and as many short tunnels, the longest 120', together with 100' of trenching. Ores carry appreciable values in gold and silver as well as copper.

INYO COPPER MINES & SMELTERS CO.

CALIFORNIA

Reorganized, 1911, as the Inyo Copper Mines Corporation, which see.

INYO COUNTY CONSOLIDATED COPPER CO.

CALIFORNIA

Idle and probably dead. Letters unclaimed at Citrus, Inyo Co., and Los Angeles, Cal. D. J. Lang, manager, at last accounts. Lands, 7 copper claims and 5 gold claims, 5 copper claims formerly owned having been sold to the New York & Inyo Copper Co.

IONE COAL & IRON CO.

CALIFORNIA

Office: 401 Crocker Bldg., San Francisco, Cal. Mine at Ione, Amador Co., Cal. A. D. Shepard, sec. and gen. mgr.; D. F. McLennan, supt. Property, 1 patented claim, on Irish hill, about 3 miles north of Ione. Is an old mine having a lenticular orebody of chalcopryrite ore, 4' thick and 75' long, dipping at 60° and proven to a depth of 300', enclosed in greenstone. The main shaft is 450' deep with another 233' shaft and 1,988' of workings. The company modestly claims but 3,000 tons milling ore blocked out. Concentrates and high-grade ore are shipped to Mountain Copper Co. at Martinez, Cal.

Equipment includes electric light plant, two 30-h. p. hoists good for 700' depth, a 3-drill Simplex air compressor, 3-stamp mill, 50 tons capacity, in 30x90' building; 1 Blake crusher 7x9", Pindar concentrating tables, 1 Frue vanner and 1 Goulds pump.

Production for 1912 was 1,097 tons, averaging 7½% copper, yielding 164,424 lbs. copper, 18,848 oz. silver and 649 oz. gold, total value being \$44,299.98.

Company plans sinking shaft No. 2 to 600' in 1913.

IOWA COPPER MINING CO.

UTAH

Probably idle. Letter unclaimed at Modena, Iron Co., Utah. L. J. Ross, manager, at last accounts. Is no relation to company of same title in Summit county, Utah. Described Vol. X.

IOWA COPPER MINING CO.**UTAH**

Letter unclaimed at Salt Lake City, Utah, and at Park City, Summit Co., Utah. Is no relation to company of same title in Iron county, Utah. A. W. Spooner, sec. and mgr.; J. H. Rolley, supt., at last accounts. Lands, on Scott hill, which is the divide between Park City and the Big Cottonwood district, are developed by a 300' tunnel, showing several rich stringers; an 1,100' tunnel develops a fissure vein carrying silver, lead and copper ores, latter of good grade. Mine is quite wet, causing some trouble in operation. Small shipments were made in 1907, 1909 and 1911, but ended latter year practically idle. Hopes to cut big fissure that carries good ore in Barry Coxé ground. Was operating in Nov., 1912, but is generally regarded as a silver mine, copper occurring in small quantities only.

IOWA & NEW MEXICO MINING CO.**NEW MEXICO**

Idle many years. Mine at Carrizozo, Lincoln Co., N. M.

IOWA-UTAH MINING & MILLING CO.**UTAH**

Idle. Letters to 300 D. F. Walker Bldg., Salt Lake City, Utah, unanswered. Mine near Frisco, Beaver Co., Utah. J. D. Pardee, pres.; F. W. Rombach, vice-pres.; J. K. Shaw, sec.-treas., at last accounts. Organized June, 1906, under laws of Utah, capitalization \$1,000,000, shares \$1 par, non-assessable; issued, \$725,000.

Lands, 15 claims, unpatented, in the Star district 6 miles from a railroad. Mine has a shaft with about 500' of workings, showing argenteiferous lead and copper ores.

IRENE MINING, SMELTING & PROSPECTING CO.**MEXICO**

Probably idle. Letters to 403 South Flores St., San Antonio, Tex., and mine address Calle Aldama 11, Saltillo, Coahuila, Mex., unanswered. Harry S. Jones, pres.; T. T. Jacobson, vice-pres.; T. Holt, sec.; J. J. Coffman, treas.; Francisco Farias, supt., at last accounts. Organized 1906, under laws of Arizona, capitalization \$500,000, shares \$10 par. Property is the Josefina mine, carrying cuprite, melaconite, chalcopryite and tetrahedrite, all more or less argenteiferous. A drainage tunnel solved water problems.

Property in revolutionary zone, where no letters are delivered and mining operations are interfered with.

IRIGOYEN HERMANOS y CA.**MEXICO**

Mine office: Huetamo, Michoacán, Mex. Firm operates small copper properties, and is an intermittent producer of small quantities of copper. Presumably idle on account of revolutionary disturbances, 1913.

IRISH MINES CO.**ARIZONA**

Idle many years and probably dead. Mine near Clifton, Graham Co., Ariz. B. A. Boyles, pres.; N. L. Lewis, vice-pres.; Otto Rosenthal, sec.; C. P. Dunn, treas. See Vol. X.

IRIZAR; SALVADOR.**MEXICO**

Address: Charcas, Moctezuma, San Luis Potosi, Mex. Property is the Cerro del Cobre mine, carrying auriferous and argenteiferous copper ore.

IRON BLOSSOM CONSOLIDATED MINING CO.**UTAH**

W. Lester Mangum, sec., Provo, Utah. H. V. Birch, asst. mgr.; L. S. Zabriskie, supt. Is the only big producer of the "Knight" group of properties, owned by Jesse Knight and associates at Tintic, Utah. Mine is a silver-lead property but like most of the Tintic mines also contains important bodies of copper ores. Capitalization 1,000,000 shares, 10 cts. par; the dividend record to Aug., 1913, is \$1.67 per share, with \$300,000 additional cash on hand. Property good but ore shoots erratic, and while it is impossible to say where next year's ore supply will come from, past experience indicates that the company will keep up its record for 1914, at least.

Other Knight properties are Beck Tunnel, Black Jack, Colorado,

Dragon Consolidated, Eureka, Opex and Swansea Extension, all now in exploratory stage.

The Iron Blossom mine is in limestone cut by a large fissure on which the orebodies are aligned. The property is opened to a depth of 1,900' and has been mining for the past 2 years a very large orebody of silver-lead ore. In May, 1913, high-grade copper ore, carrying silver, was opened on the 700' level and a large tonnage of this ore is expected when the deeper levels have been driven out to catch this shoot.

IRON CAP COPPER CO.

ARIZONA

Office: 60 State St., Boston, Mass. Mine at Copper Hill, Gila Co., Ariz. Frank P. Knight, pres.; J. Judson Dean, Andover, Mass., vice-pres.; Jas. F. Lockwood, sec.-treas., Boston, Mass.; F. A. Woodward, supt.; preceding officers and Alvin T. Baldwin, directors. Organized Feb. 7, 1911, under laws of Maine, capitalization \$2,000,000, shares \$10 par, fully paid and nonassessable; 50,000 preferred and 150,000 common; issued, 25,215 preferred, 76,804 common. A \$50,000 7% bond has also been authorized and \$46,590 issued. Federal Trust Co., transfer agent; Exchange Trust Co., auditors. Stock is listed on Boston curb. Annual meeting, first Tuesday in January. Is practically a reorganization of the National Mining Exploration Co., buying its property under foreclosure sale May 25, 1911. Company reports Aug. 1, 1913, cash in bank, \$16,035; notes receivable, \$29,817; with total indebtedness, \$15,966.

Property comprises 2 groups, the Iron Cap at Globe, and the Fumarole group in Graham county, Ariz. The Iron Cap group consists of 9 claims, 107 acres, immediately west of the Arizona Commercial holdings and next to the Old Dominion property at Globe, Ariz. The claims show shale and quartzite cut by diorite in depth and traversed by a fissure vein running N. E. and S. W. and dipping at 70°. This vein has been developed to a depth of 650' and shows 1½ to 12' of commercial ore for a length of 450' on the 650' level, the ore averaging 5.74% copper with good silver values.

Development is by the Williams shaft, 802' deep, with levels at 660' and 776' and about 550' of drifting on the upper levels. In Aug., 1913, the new company had opened up 694' of new ground on the 650' level, developing an ore shoot as just noted; 73 cars of ore have been shipped from 3 stopes on this drift. On the 800' level 390' of new ground has been opened and drifting is being done to get under the 650' ore shoot. Commercial ore has been opened at 2 points on this level. Another shaft 600' deep is not worked. Total extent of underground workings, 5,500'.

The main workings on the Iron Cap property are on the Black Hawk vein, which is generally supposed to apex in Arizona Commercial property.

The Fumarole group consists of 7 patented claims in the Lone Star mining district, 9 miles N. E. of Safford, Graham county, Ariz. These claims are supposed to contain gold ores in a volcanic neck, but have thus far been unremunerative, though the former company spent \$125,000 on the Fumarole mine and opened up a little low-grade ore on the 500' level. The Fumarole shaft was 570' deep but has been idle since Dec., 1909. The mine has 2,000' drifts and crosscuts on the 200', 500' and 700' levels.

In June, 1913, company shipped 14 cars of ore to the Old Dominion and El Paso smelters, amounting to 569 tons and returning 113,618 lbs. copper and 8,650 oz. silver, netting \$14,206, or a profit of \$9,551.

IRON DYKE COPPER CO.

OREGON

Idle. Letters to Erie, Pa., unanswered. Mine near Homestead, Baker Co., Ore. C. N. Conrad, pres.; H. G. Fink, vice-pres.; A. A. Clauss, sec.; F. F. Curtze, treas.; preceding officers, Geo. R. Metcalf and Davenport Gal-

braith, directors. Frank E. Pearce, supt., at last accounts. Organized under laws of Pennsylvania, capitalization \$500,000, shares \$100 par. Erie Trust Co. holds title by trust deed and bond. The mine has several thousand feet of workings and has been claimed in the press to have 200,000 tons of ore blocked out for stoping, with considerable ore on the dumps. Property was optioned to the General Development Co., but option was surrendered May, 1910.

IRON HAT MINING CO.

UTAH

Idle. Letters returned from 307 Atlas Blk., Salt Lake City, Utah, and Eureka, Juab Co., Utah. C. P. Harvielle, pres.; Geo. N. Lawrence, vice-pres.; C. E. Hinsh, sec.-treas.; Wm. Hoffman, supt., at last accounts. Organized 1907, under laws of Utah, capitalization \$1,000,000, shares \$1 par; issued, \$645,000. Shares listed on Salt Lake exchange.

Property, 6 claims, partly patented, including the Texas and Mississippi claims in the East Tintic district, taken over about June, 1910, under quit-claim deed from the Three Metals Mining Co. Property has a surface showing of slightly auriferous and argentiferous copper ores. Mine has a 55' vertical shaft and a 115' incline shaft.

IRON-HORSE GOLD-COPPER MINING CO. BRITISH COLUMBIA

In liquidation. Property sold to Canadian Consolidated Mining Co., Ltd., of Canada, for \$10,000, in 1912.

IRON KING MINE.

NEW MEXICO

C. K. Hartley, operator, Oro Grande, Otero Co., N. M. Property, near Brice, shows fissure vein and replacement deposits of oxidized copper ores carrying gold and silver values from which shipments of 50 tons a day were made during Sept., 1913.

IRON KING MINING CO.

UTAH

Office: Provo, Utah. Mine near Eureka, Juab Co., Utah. Col. C. Edw. Loose, pres.; Reed Smoot, vice-pres.; P. G. Peterson, sec., all of Provo, Utah. Property is in Tintic district and has not yet found a body of silver-lead ore. Assessments of 1 ct. a share have paid for development work. Mine has a 600' shaft and a 3,500' tunnel, planned to be driven 6,000' eventually. The mine shows large quantities of iron ore, 100,000 tons being, it is said, blocked out and ready for stoping. Mine closed down March, 1912, owing to inability to market the iron ore at a profitable figure.

IRON MASK MINE.

BRITISH COLUMBIA

Owned by Kamloops Copper Co., at Kamloops, Yale district, B. C.

IRON MASK MINING CO.

MONTANA

Office: St. Maries, Idaho. Mine near Carter, Missoula Co., Mont. Wm. Carney, pres.; J. W. Masser, vice-pres.; Jos. B. Hunter, sec. and mgr.; J. G. Fralich, treas.; preceding officers, C. M. Carney, W. J. Schneider, J. W. Scott and Frank Carney, directors. Organized May, 1908, capitalization \$500,000, shares \$1 par. Assessment No. 3 of 2 mills per share levied June, 1913.

Lands, 10 claims, well timbered and watered, 3 miles from a railroad, having a 10' vein of concentrating ore, with an 18" vein of smelting ore. The mine has a tunnel of 1,700' length, with back of about 700', with a total of 2,400' of drifting on the vein in the various tunnels. The workings show silver-lead ore of good average grade, with a small percentage of copper. Drove 1,200' new tunnel work in 1912. Equipment includes gasoline power and necessary mine buildings.

IRON MOUNTAIN COPPER CO.

CALIFORNIA

Office: 301 First National Bank Bldg., Riverside, Cal. Mine near Blythe City, Riverside Co., Cal. Harwood Robbins, pres.; E. W. Tucker, vice-pres.; Holton Webb, sec.-treas., all of Riverside, Cal. Organized about July, 1911,

Under laws of California, capitalization \$10,000, shares \$1 par; issued, 5,000 shares.

Property, 35 claims, about 700 acres, known as the Crescent group, in Ironwood mining district, Riverside county, Cal., 26 miles south of Blythe junction on the Parker cut-off of the Santa Fé railroad. Claims show fissure veins in granite and porphyry, the main ledge being traceable 2 miles.

Development includes a 120' shaft with a level at 100' depth that is 70' long and shows high-grade copper ore containing visible gold. Ore shipments by former owners averaged \$100 per ton. Outcrop shows high-grade ore at several places. Mr. Robbins, who has furnished all the money thus far, plans putting in a small smelter.

IRON MOUNTAIN MINE.

CALIFORNIA

Owned by Mountain Copper Co., Ltd., at Keswick, Shasta Co., Cal.

IRON MOUNTAIN MINING CO.

BRITISH COLUMBIA

Idle. Mine office: Jedway, Queen Charlotte island, B. C. Property is on Moresby island of the Queen Charlotte group, in the vicinity of the Ikeda Mines Co., Ltd. Shut down in 1911 and presumably now moribund.

IRON QUEEN MINING & SMELTING CO.

ARIZONA

Address: Wm. T. Read, 15 William St., New York City. Mines near Mayer, Yavapai Co., Ariz. F. W. Wood, Wm. T. Read, A. D. Barnhart, I. D. L. Williams and H. B. Bishop, directors. Capitalization \$3,500,000, shares \$10 par. Is a company formed to take over, subject to a mortgage for \$130,000, the greater part of the former holdings of the George A. Treadwell Mining Co., sold at tax and foreclosure sales. The Boggs and Hackberry properties are not included, being bought by the Commercial Mining Co., controlled by Phelps, Dodge & Co.

The organizers of the Iron Queen offered the stock at 75 cts. a share to stockholders of the Treadwell Co. Property consists of Iron Queen group near Mayer, the narrow gauge railway, the smelter plant, 31 claims and interests in 3 others in the Verde mining district. The Iron Queen group was favorably reported upon by M. A. Finney, former manager of the Consolidated Arizona Smelting Co. (Humboldt smelter), who states that this property is leached down to 300' level, has zinc ore between that and 400' level and has 6' pyritic ore carrying 3% copper, 38% iron and 38% sulphur below that and on the 500' level.

As the former Treadwell holdings are not considered as even decent prospects, the shares of the new company are considered unfavorably.

IRON SILVER MINING CO.

COLORADO

Offices: Room 1408 Lord's Court, New York, and 615 Stevens Bldg., Detroit, Mich. Mine near Leadville, Lake Co., Colo. De Forest Paine, pres.; W. R. Cobb, vice-pres.; Homer A. Hoit, sec.; Frémont Woodruff, treas.; preceding officers, Hon. Thos. W. Palmer, Gen. Anson G. McCook, Eber W. Cottrell, H. C. DuVal, Henry G. Stevens, Samuel E. Reinhardt and Henry C. Bush, directors; Geo. O. Argall, gen. mgr.; Wm. Carson, supt.

Organized March, 1880, under laws of New York, capitalization \$10,000,000, shares \$20 par. Net earnings were \$267,034.64 in 1904; \$515,127 in 1906; \$65,366.14 in 1907; \$6,960.46 in 1908; \$183,121.93 in 1909; \$138,308 in 1910; \$187,639 in 1911; \$274,322 in 1912. Dividends were \$400,000 in 1906; \$300,000 in 1907; none in 1908; \$50,000 in 1909; \$200,000 in 1910; \$100,000 in 1911 and \$200,000 in 1912, with total dividends, to end of 1912, \$4,650,000. Farmers Loan & Trust Co., New York, registrar. Annual meeting, first Tuesday in March.

In 1912 company mined 53,618 tons of ore which, after sorting, amounted to 46,410 tons of a gross value of \$1,848,298, of a net value of \$523,904. Total income for year was \$548,119, and total expense \$273,797.

The company owns and is now operating the Moyer, Tucson and Stevens mines, on Iron hill, about 2 miles east of Leadville, and also controls, through stock ownership, the Nisi Prius Consolidated Mining Co.

The Moyer mine is the main producer, yielding 24,752 tons of ore in 1912 of a gross value of \$1,115,412 and a net value of \$288,546. The mine has over 2 miles of workings and contains great orebodies of complex lead-zinc ore from which large tonnages have been extracted for several years past. This ore is very low grade but the zinc content permits shipment. The new orebody opened and stoped in 1912 was 18' thick, 70' wide and 360' long and had about 30,000 tons left in Feb., 1913. Another ore shoot, cut in 1912, is 5' thick, 8' wide and 110' long.

The Tucson mine yielded high-grade copper ore in 1911, from a lens of copper sulphide found in the Tucson fault between the 600' and 700' levels, but extensive prospect work has not revealed any other body of this ore, and this lens is now practically worked out. The copper production of the mine was 1,448 tons containing 56,410 lbs. of copper in 1912, and leasers produced 2,133 lbs. more in the same year. The total production of the mine for 1912 was 21,657 tons of a gross value of \$732,866. The Tucson has a 1,200' aerial tram, of 12 tons hourly capacity, costing \$7,855, from the shaft to the railway siding, which has cut the cost of ore transportation to about 12 cts. per ton, in place of former cost of 60 cts.

Production of the mines as a whole was 62,704 tons, including ore mined by leasers valued at \$2,350,675 gross or \$636,609 net value in 1912. Production has been as follows: 948,902 lbs. fine copper, 3,608,351 lbs. lead, 45,805,699 lbs. zinc, 950,067 oz. silver and 3,049 oz. gold in 1904; 69,477 lbs. copper, 4,542,938 lbs. lead, 61,738,134 lbs. zinc, 425,050 oz. silver and 2,043 oz. gold in 1906; 21,321 lbs. copper, 5,489,047 lbs. lead, 34,239,954 lbs. zinc, 298,598 oz. silver and 1,360 oz. gold in 1907; 8,080 lbs. copper, 2,828,692 lbs. lead, 14,624,954 lbs. zinc, 60,878 oz. silver and 135 oz. gold in 1908 and 432,472 lbs. copper, 3,170,268 lbs. lead, 18,619,067 lbs. zinc, 455,883 oz. silver and 1,258 oz. gold in 1909. In 1912 the company produced 58,543 lbs. copper, 323.92 oz. gold, 470,403 oz. silver, 12,874,099 lbs. lead, 21,601,428 lbs. zinc and 2,816,079 lbs. iron. The property is well equipped and well managed.

IRON SPAR COPPER MINING CO.

MONTANA

Probably closed down. Letters unclaimed at Wallace, Idaho. Mine at Saltese, Missoula Co., Mont. Edw. Eisman, pres.; Albert Honeker, vice-pres. and treas.; W. W. Bixby, sec.; John J. Curran, gen. mgr., at last accounts; preceding officers and Morton Webster, directors. Capitalization \$1,000,000, shares \$1 par. Lands, 4 claims, near the Leslie Amazon-Dixie mines in Leslie gulch, near the Idaho-Montana divide. The property has a fissure vein in quartzite, traceable 6,000', showing chalcopryrite and galena, at and near surface, said to assay 22.5% copper, 52% lead, 40 oz. silver and \$2.80 gold per ton. Development is by a 700' tunnel.

IRONCLAD MINE.

IDAHO

Idle. Mine near Murray, Shoshone Co., Idaho. C. Stout, mgr., at last accounts. Mine has a 900' tunnel, showing silver-lead ore of concentrating grade, and breasted in copper sulphides, at 1,000' from the portal. Letters neither returned nor answered.

IRONSIDE MINE.

MONTANA

Office: care Dr. F. A. Ironsides, Butte, Mont., Mine address: Whitehall, Jefferson Co., Mont. Mine at head of Little Boulder river, 15 miles from Butte, shows fissure vein in granite developed by 1,200' adit tunnel opening a shoot of silver-copper-lead ore in Aug., 1913.

IROQUOIS COPPER CO.

MICHIGAN

Liquidated, 1899, and lands sold to Osceola Consolidated Mining Co.

IRVINGTON SMELTING & REFINING CO.**NEW JERSEY**

Address: Charles Engelhard, treas., 30 Church St., New York. Works at Irvington, N. J. W. L. Glorieux, pres.; C. O. Baker and C. W. Baker, vice-presidents; Robert A. Knorre, sec. Property is an electrolytic smelter and refinery for gold, silver, platinum and copper ores.

ISABELLA COPPER MINING CO.**CALIFORNIA**

R. E. Rader, M. A. Fesler, Howard W. Williford, of Berkeley; E. J. Rader, Sacramento, and E. E. Rader, of Barzilla, San Mateo Co., Cal., directors. Organized 1911, capitalization \$500,000. No trace of operations secured.

ISLAND CITY COPPER MINING CO.**WYOMING**

Probably dead. Letter unclaimed at Saratoga, Carbon Co., Wyo., and Eaton Rapids, Mich. Mine has a contact deposit carrying copper ore between a norite dike and schist.

ISLAND COPPER CO.**MICHIGAN**

Office: 1400 Alworth Bldg., Duluth, Minn. Thos. F. Cole, pres.; Geo. C. Stone, vice-pres.; Frederick W. Nichols, sec.; preceding officers, F. W. Heimick, Oscar J. Larson, Henry Nolte, Geo. G. Barnum, Geo. A. Tomlinson and Julius H. Barnes, directors; Edw. J. Maney, treas. Organized March 9, 1909, under laws of Michigan, capitalization \$1,000,000, shares \$25 par, \$6.00 paid; issued, \$678,375. Annual meeting, first Tuesday in June.

Property on Isle Royale comprises over 92,000 acres out of the 125,000 acres comprising the island. It includes the former holdings, 83,720 acres, of the Isle Royale Land Corporation, Ltd., and lands of the Island Mining Co., all on Isle Royale, the largest fresh water island of the globe. Considerable mining of a rather desultory nature has been done upon these lands at various periods in the past, and a limited production of copper secured therefrom. The Island Mining Co. and its predecessors did rather extensive work on a conglomerate bed of the Keweenaw copper-bearing belt, sinking 3 shafts, 1 of which was said to be 1,000' deep with a fair showing at the bottom of the mine, but work was suspended on this property in 1873. No exploratory or development work has been done on the island since 1892.

No work has been done by the present company, but the management is said to contemplate extensive diamond drilling in the near future.

ISLAND MOUNTAIN COPPER MINE.**CALIFORNIA**

Frank Leach, principal owner, 2015 Oakland Ave., Piedmont, Cal. Company not incorporated and has no offices. Property consists of 4 patented mining claims and other property aggregating 225 acres, located in the southwest corner of Trinity county, within 600 yds. of the California Northwestern railroad now under construction from San Francisco to Humboldt bay. The nearest post office is Irona, Humboldt county, Cal.

Claims show sandstone with lenticular bodies of copper-iron sulphides outcropping at several places. Development is said to indicate that these various outcrops are part of 1 mass, whose estimated dimensions are 90 to 100' in width, 450' in length and a proven depth of from 60 to 145'. Ores are stated to carry 2½% copper, 1½ oz. silver and \$2 in gold per ton.

Development is by 4 tunnels of 380', 300', 280' and 140' in length and by 4 shallow incline shafts. The 1,100' of underground workings are estimated to block out 275,000 tons of ore, but these workings are now caved and the property idle because of inaccessibility; with the completion of the railroad in 1914 property should become active.

ISLE ROYALE COPPER CO.**MICHIGAN**

Office: 12 Ashburton Place, Boston, Mass. Mine office: Houghton, Houghton Co., Mich. Rodolphe L. Agassiz, pres.; Quincy A. Shaw, vice-

pres.; preceding officers and F. L. Higginson, Chas. Q. Whitten, Wm. E. L. Dillaway, F. L. Whitcomb and Chas. N. King, directors; Geo. A. Flagg, sec.-treas.; Clarence H. Bissell, asst. sec.-treas.; Jas. MacNaughton, gen. mgr.; Jas. E. Richards, mine supt.; Jas. G. Glanville, mill supt.; Harry Reeder, engr.; John T. Reeder, chief clerk and purch. agt.; Harry E. Lukey, clerk; Edward Colenso, chief mg. capt. Organized March, 1899, under laws of New Jersey as a merger of the Isle Royale Consolidated Mining Co. and Miners' Copper Co., capitalization \$3,750,000, shares \$25 par. Old Colony Trust Co., Boston, transfer agent; State Street Trust Co., Boston, registrar. Company owns a one-sixth interest in the Lake Superior Smelting Co. Annual meeting, first Wednesday in April, at 243 Washington St., Jersey City, N. J.

The company ended 1912 with balance of assets \$557,743, and on June 30, 1913, reported balance of assets of \$383,743. Net profits, 1912, were \$430,045.57, and only about \$1,000 for the first 6 months of 1913. A dividend of \$1 per share was paid March 31, 1913.

Lands, 3,520 acres and an 80-acre mill site. Mineral lands include the old Isle Royale, Grand Portage and Huron mines, the Dodge and Frue prospects, the mineral rights in the Montezuma tract of about 200 acres purchased, 1913, for \$100,000, and sundry undeveloped tracts. The Hussey-Howe tract of 280 acres, lying northeast of the Superior, supposed to carry the extension of the Baltic bed, was bought, 1907, for \$220,000. Lands include all of Secs. 1, 2 and 11, and parts of Secs. 3, 9, 10 and 15, T. 54 N., R. 34 W., also 160 acres in Sec. 6, T. 54 N., R. 33 W., 40 acres in Sec 31, T. 55 N., R. 33 W., and 160 acres in Sec. 36, T. 55 N., R. 34 W., giving a compact tract carrying about 2½ miles of the strike of the system of copper-bearing beds.

The Isle Royale has 3 parallel amygdaloidal beds, with strike of N. 32° E. and average dip of 56°, of which 2 have been extensively opened, these being the Isle Royale and Portage beds, the latter lying approximately 200' west of the former. The shafts are on the Isle Royale, but the Portage bed is opened on many levels by crosscuts. East of the amygdaloids is the "Mabbs vein," lying near the Eastern sandstone, 4 to 7' wide and rich in mass and barrel copper, but deficient in stamp rock. It was opened to a depth of about 250' by John and Austin Mabbs, about 1875, and has been tested to some extent by the present owner. There also are unidentified and unexplored copper-bearing amygdaloids lying west of the Portage bed and occasional narrow fissure veins carrying arsenical copper ores.

The 3 old mines included in the present Isle Royale tract, made 48,452,590 lbs. fine copper, of which the Huron furnished 35,766,225 lbs., the Isle Royale 9,204,074 lbs., and the Grand Portage 3,482,294 lbs. These products were secured under primitive conditions, at a net aggregate loss of about \$2,500,000. The old Isle Royale and Grand Portage mines were opened in 1853, and the Huron in 1855. The 3 old mines have 28 old shafts with about 5 miles of old workings in the Huron and 3 miles of workings in the Isle Royale and Grand Portage mines combined. Underground masonry dams have been built at various points to hold back water in the old workings, the new workings being under the old, without connections. The history of these 3 old mines is given in detail in Vol. II.

Considerable diamond drilling has been done from time to time. New underground openings were 8,251' in 1906; 8,728' in 1907; 10,833' in 1908; 15,919' in 1909; 14,588' in 1910; 15,366' in 1911; 19,106' in 1912. About 75 rock drills are used.

No. 1 shaft, near the northern boundary, was completely gutted by fire, Dec., 1903, and was abandoned. This shaft had 3 compartments and was

1,335' deep, opened on the Isle Royale bed, with crosscuts driven on the 11th to 15th levels, inclusive, to the Portage bed, lying 150 to 220' westward, with about 2 miles of drifts opened thereon, stopping having been about equally divided between the 2 beds, which were found markedly similar in characteristics and copper values. Concrete dams have been built across the south drifts of No. 1 at the 13th and 14th levels, holding back the mine water. Surface water is collected on the 8th level and sent to No. 2 shaft for forking out. The surface plant at No. 1 was dismantled, 1908, machinery going to No. 4 shaft.

No. 2 shaft, with 3 compartments, 2,280' southwest of No. 1, was 3,162' deep at the end of 1912. This shaft produces less mass copper than formerly, and the north drifts have not looked especially well for several years, the average of ground being below that of the mine as a whole.

No. 2 shaft has a combination shaft rock house, 44x60' in size, and 90' high, with 18x24" and 13x20" Portage Lake crushers. The engine house is equipped with a hoist having 18' 6" drums, with lathe-turned grooves for 6,000' of 1½" cable, capable of raising 6-ton skips from a depth of 6,000'.

No. 3 is merely a site for a shaft, to reopen the old Huron mine.

The new shafts, Nos. 4, 5 and 6, are all on the Isle Royale bed, at the southern end of the property, and have several miles of workings showing considerable heavy copper. These shafts are unconnected with the former workings, in shafts Nos. 1 and 2, at the northern end of the property. Shafts 4, 5 and 6 are connected by drifts on the upper levels.

No. 4 shaft, about 3,100' south of No. 2, was 1,940' deep Dec. 31, 1912, developing stamp rock of very fair average grade. Equipment includes a 32x72" Nordberg duplex-cylinder hoist, good for 1 mile depth and a 35-drill air compressor, both taken from No. 1 shaft. There is a cylindrical steel shaft rock house, built by the Wisconsin Bridge & Iron Co., having cylindrical rock bins 42' in diameter and 32' high. The power plant has a 140' steel-brick-lined self-supporting stack.

No. 5 shaft, about 5,100' south of No. 2, on Sec. 2, was started Oct., 1906, and was 1,206' deep Dec. 31, 1912. The shaft is sunk in the footwall, and is equipped with a 20x60" hoist, good for a depth of 3,000'.

No. 6 shaft, about 7,300' southwest of No. 2, near the center of Sec. 11, has 3 compartments and was 1,554' deep, Dec. 31, 1912, developing very good average ground, the bed showing much epidote. The levels are opened at 100' and 120' intervals. On surface there is a circular steel shaft rock house, similar to that at No. 4. The plant at No. 6 includes a brick engine house, with hoist and 45-drill air compressor, and a steel boiler house having a 140' brick-lined self-supporting steel stack.

"A" shaft, started Sept., 1908, on the Hussey-Howe tract, is 972' deep, with the first plat cut at depth of 350'. A 205' crosscut, at depth of 474', discloses only the bed in which the shaft is sunk. On the 3rd level, at depth of 714', a drift was run south to within 50' of the Houghton Copper Co. boundary, disclosing a fair amount of amygdaloidal rock, not carrying copper in promising quantities. "A" shaft is supposed to be sunk on the Baltic bed, but there is very great doubt as to whether the shaft really is opened on the northern extension of the Baltic, and failure to locate the twin Baltic bed, within a distance of 205' in the crosscut on the 474' level, accentuates this doubt.

The Sec. 12 shaft, begun Oct., 1905, and discontinued Jan., 1908, at depth of 812', also was sunk in search of the Baltic bed and drifts and crosscuts were opened in 4 directions, without securing satisfactory results. The

shaft was sunk in a badly disturbed amygdaloidal bed, practically barren of copper.

A shaft was started, 1904, on Sec. 10, but was discontinued because of the heavy overburden, and a diamond drill substituted, the drill cores showing an amygdaloidal bed of which about 5' in width carried stamp-copper in fine grains.

The main plant, at No. 2 shaft, includes No. 2 engine house, a compressor house having a 35-drill Nordberg 2-stage air compressor; a 44x72' boiler house, with a 16x72' coal-storage addition and a 3,000-ton coal trestle, having three 150-h. p. 84" Burt horizontal boilers, taking water from a dam 300x500x6'. The machine shop is 40x60', of steel, on stone foundations. Shaft houses and rock houses are lighted by electricity, commercial current being taken from the Houghton County Electric Light Co. The company has a private telephone system. There are about 100 dwellings on the company's lands.

The Isle Royale railway, owned by the company, connects the mine and mill with about 5 miles of main line, having easy grades, and was rebalasted and bridges and trestles strengthened, 1908. Equipment includes 35-ton, 55-ton and 60-ton locomotives, and 40 forty-ton steel rock cars, equipped with air brakes.

The mill site, at the mouth of Pilgrim river, has nearly 1 mile of frontage on Portage lake. The mill, 134x210', of steel frame, on stone foundations, has three 2,000-ton rock bins and 3 Nordberg stamps having circular mortars and three-eighths-inch screen openings. The stamps rest on concrete bases, 20' thick, and are fitted with steeple-compound steam cylinders. Each stamp has a maximum capacity for 700 to 750 tons daily. The dressing floor has 72 rough jigs and 30 finishing jigs, of the Parnall-Krause type, circular slime tables, and Bartlett and Wilfley tables to treat slimes from the round tables. There are rolls with fixed bearings to regrind coarse gravel from the mortars.

The mill has a complete machine shop on the second floor, power being furnished by a 750-h. p. engine, taking steam from four 250-h. p. boilers in a 46x72' boiler house at the rear of the mill.

There is a 32x600' wharf, with deep water alongside, at the mill site, with appliances for unloading coal and general freight and for the dispatch of mineral, in scows to the Dollar Bay smelter, 2 miles across Portage lake.

Water is furnished the mill by a 16,000,000-gal. Nordberg Corliss pump, especially designed to handle muddy water, having a triple discharge into a 30" riveted steel water main, running 2,200' from pump house to mill, the pump being located some distance from the mill, to obviate stamp sand clogging the intake. Three 100-h. p. boilers furnish power for the pumps, fuel being taken from a large coal trestle at the rear of the pump house boiler rooms. A dam near the mill supplies feed water for the boilers.

Recent production has been as follows: 2,973,761 lbs. fine copper in 1905; 2,937,098 lbs. in 1906; 2,667,608 lbs. in 1907; 3,011,664 lbs. in 1908; 5,719,056 lbs. in 1909; 7,567,399 lbs. in 1910; 7,490,120 lbs. in 1911; 8,186,957 lbs. in 1912, and 3,326,655 lbs. in the 6 months ended June 30, 1913. Cost of finished product was 11.84 cts. per lb. in 1910; 10.85 cts. in 1911; 11.89 cts. in 1912, and 15.61 cts. in the first half of 1913.

The Isle Royale is a low-grade mine, but from results obtained in more recent years, shows itself entirely capable of earning substantial profits, notwithstanding the poor showing made in 1913. Large ground reserves are maintained and necessary and with a larger rock output in prospect, moderately profitable operations for many years to come are anticipated.

IT MINING CO.**ALASKA**

Office: Ketchikan, Alaska. Mine 1 mile from the shore on Kasaan bay, Prince of Wales Island, Alaska. H. C. Strong, pres.; J. C. Barber, sec. and mgr.; C. H. Black, treas. Organized 1908, under laws of Washington, capitalization \$30,000, shares \$1 par, nonassessable.

Property comprises 12 claims, 5 in process of patenting, in the Ketchikan district, showing a number of contact deposits between diorite and limestone. The ore deposit consists of magnetite with chalcopyrite and some bornite, varying up to 15' in width, and estimated by the management to average 8% copper, 1 oz. silver and \$3.50 gold per ton. Mine was opened 1908, and is only worked summers. Development is by a prospect shaft and 1,400' tunnel, driven to cut the orebody 200' below the workings from the 200' shaft. Old workings include open cuts and overhand stopes above 200' level, from which 1,400 tons were shipped to the Tyee smelter in 1910.

Equipment includes a 15-h. p. hoist and a 2-stage Sullivan air compressor. The mine has ore bunkers and a 1,200' gravity tram connecting with a 4,000' ground tram leading to 1,000-ton shipping bunkers on a substantial wharf. The company planned driving a new 1,400' tunnel to cut the present workings at depth of 400', or 200' below the bottom of the shaft, to serve also for drainage, as there are water courses in the limestone that cause considerable trouble.

Production is estimated at 150,000 lbs. fine copper in 1908; 600,000 lbs. in 1909, and 800,000 lbs. in 1910. Net smelter returns to end of 1910, \$150,000. Property considered promising and management good.

ITMAY MINE.**WYOMING**

Idle. Office: Rawlins, Wyo. Mine near Rambler, Carbon Co., Wyo. I. C. Miller, mgr.; Albert Bryle, supt., at last accounts. It is not an incorporated company. Property, 4 miles south of Rambler, is said to have a 20' vein, carrying a paystreak of high-grade ore, apparently undeveloped and another vein up to 8' in width carrying sulphide ore averaging about 8% copper. Development is by a 300' shaft. Mine has been a dismal failure to date, largely owing, it is said, to rank ignorance of mining.

IVANHOE MINING CO.**ARIZONA**

Mine address: Patagonia, Santa Cruz Co., Ariz. H. H. Ives, Minneapolis, Minn., pres.; Jas. Johnson, vice-pres. and gen. mgr.; H. B. Cramer, sec.-treas.; preceding officers and Jas. E. Hurd, directors. Organized 1906, under laws of Arizona, capitalization \$750,000, shares \$50 par, nonassessable; issued, \$675,000. Annual meeting, third Monday in January.

Property consists of the Ivanhoe mine and various claims, 25 in all, unpatented, 500 acres, in the Wrightson district, 4 to 6 miles southwest of Patagonia, the nearest rail point. The group shows rhyolite, andesite and diorite, with brecciation zones carrying orebodies, of which 5 are estimated by management to average 27' in width, carrying chloride, silver ore, gray copper and chalcocite, estimated by management to average 16% copper, 6% lead and 225 oz. silver per ton.

Development is by the 200' Commercial shaft, with considerable cross-cutting, developing, it is said, large bodies of milling ore. Some \$15,000 worth of high-grade ore, some of it carrying 27% copper and 1,700 oz. silver per ton, has been shipped. In 1912, a 15" streak of ore carrying nearly 5,000 oz. silver (\$3,100) per ton, was reported, but its length was not stated. There are also several tunnels, with 2,700' of workings, estimated to show 100,000 tons of ore. Equipment includes a 70-h. p. steam plant with a 50-h. p. hoist good for 1,000' depth. There are 5 buildings, and water is supplied by a 6-h. p. gasoline pump.

IVANPAH MAMMOTH GOLD & COPPER MG. CO. CALIFORNIA

Probably dead. Letters unclaimed at former offices at San Diego, Cal., and Ivanpah, San Bernardino Co., Cal. Capitalization \$2,000,000, shares \$1 par. Lands, 22 claims, 10 held under option, 435 acres, 12 miles west of Ivanpah, claimed to show a ledge 8' in width, of which 6' is said to carry copper and lead sulphides, giving surface assays of \$9 to \$105 per ton.

IVY WILSON MINES. NEVADA

Office: Contact, Elko Co., Nev. M. McArdle, owner. Properties, near Contact, developed by tunnels showing streaks and bunches of high-grade malachite ore.

JACK POT MINES. MONTANA

Property is a group of claims 3 miles north of Clinton, Missoula Co., Mont., developed by tunnels 100', 300' and 500' long, respectively, which expose several well-defined orebodies showing concentrating ore carrying copper, gold and silver values.

JACK POT MINING & MILLING CO. WYOMING

Idle many years. Office: 55 High St., Oshkosh, Wis. Ole Granberg, pres. and gen. mgr.; H. Thorsgaard, vice-pres.; H. O. Granberg, sec.-treas. Organized Dec. 23, 1903, under laws of Wyoming, capitalization \$1,000,000, shares \$1 par. Lands, 9 patented claims, 180 acres, in the Battle Lake district, showing fissure veins in diorite and chloritic schist, and 2 contact veins, between diorite and porphyry, carrying carbonate and sulphide ores. Two veins, slightly developed, are said to average 14' and 60' width. The smaller vein has averaged 8% copper and \$3 to \$12 gold per ton, the larger vein showing very low-grade copper ore. Development by a 75' tunnel, 100' shaft and 8 pits of 20 to 36' depth, with 411' of workings. Company still in existence and reports that all taxes have been paid to date.

JACK RABBIT MINING CO. MONTANA

W. H. Greater, superintendent, Argenta, Beaverhead Co., Mont. Mine has copper-silver ore developed by shaft workings, equipped with gasoline hoist.

JAHNVILLE MINING CO. ARIZONA

P. O. Box 428, Miami, Gila Co., Ariz. F. W. H. Jahn, pres.-treas. and purch. agt. Organized Sept. 18, 1908, under laws of Arizona, capitalization \$600,000, shares \$1 par, fully paid and nonassessable; issued, 304,000 shares. Annual meeting, August 11, 1911.

Property, 26 claims, about 500 acres in Gold gulch, 9 miles from Miami and southwest of the Continental mine. Claims cover part of an interfault block of diorite and overlying quartzite and limestone, also part of the granite porphyry mass west of the north and south fault of the Continental mine. The latter property has developed a stringer lode of pyritic ore with much metamorphic impregnation of the porphyry walls. The Hahnville claims have been examined by R. G. Thomas of Miami, who reports iron-stained gossan in which development has disclosed pockets of high-grade lead and copper ore.

Development is as yet but slight; a shaft is being sunk on 1 silver vein and a tunnel on a second vein. Two other veins will be explored by tunnels later.

The financial scheme of the company is unusual; the stock now offered is stated to be guaranteed by gold bonds of the Granite Securities Co. of Los Angeles, Cal., and the purchaser is given a contract warranting him the return of his investment in 10 years or the delivery of equivalent bonds. Property appears to be a promising prospect, but the reliability of the guaranteeing company cannot be vouched for.

JALISCO MINING & SMELTING CO.**MEXICO**

Was absorbed by La Regina Mining Co., Dec. 31, 1909. Organized Oct. 29, 1904, under laws of Arizona, capitalization \$2,500,000, shares \$1 par, non-assessable; issued, \$1,740,857. Was a holding company owning the entire stock issue of the Philadelphia Copper & Gold Mining, Milling & Smelter Co.

JALISCO (MEXICAN) MINING SYNDICATE, LTD.**MEXICO**

Idle. Office: 54 New Broad St., London, E. C., England. Mine address: Zapatliltic, Ciudad Guzmán, Jalisco, Mex. A. Firth, chairman; preceding officer, R. T. Harper and C. C. Wyllie, directors; W. W. Barrell, sec.; M. P. Gosset, Mexican agt.; G. V. Mitchell, mine supt., at last accounts. Organized Jan. 18, 1906, under laws of Great Britain, capitalization £15,000, increased Aug., 1907, to £25,000, shares £1 par; issued, £16,000, fully paid. Property, the Malpillas mines, with 80 pertenencias, 198 acres of mineralized ground.

JAPAN-FLORA MINES & TUNNEL CO.**COLORADO**

Idle. Office: 709 Colorado Bldg., Denver, Colo. Mine address: Telluride, San Miguel Co., Colo. J. J. Fisher, pres.; Chas. H. Johnson, vice-pres.; Wm. P. Humphreys, sec.; J. P. H. Cunningham, treas.; preceding officers and Geo. W. Johnson, directors. Organized Aug. 22, 1903, under laws of Colorado, capitalization \$2,000,000, shares \$1 par, nonassessable; fully issued. Bonds, \$300,000 authorized, at 6%; issued, \$193,500. Annual meeting in October.

Company is a silver-gold producer, whose ores carry a little copper. The holdings comprise 43 patented claims, area 301 acres, and a 35-acre mill site, in the Upper San Miguel district, 4 miles from a railway. Property shows 5 fissure veins, in brecciated andesite and porphyry. Three of these veins are extensively developed, showing a width of 1 to 8', and carrying complex sulphide ores containing lead, copper and zinc sulphides with gold and silver, associated with pyrite, in a quartz gangue. Ore said to average 1 to 2% copper, 3 to 40% lead, 2 to 20% zinc, 20 to 50 oz. silver and \$8 to \$30 gold per ton.

Mine is developed by 2 shafts and a 2,975' tunnel, with a number of lesser workings, the total underground development amounting to nearly 35,000' in 1913. The mine is estimated by its manager to have 96,024 tons of ore blocked out for stoping, of \$1,383,478 gross and \$626,662 net estimated value. Equipment includes a 2-drill Leyner electric air compressor. There are 17 buildings.

Property has a concentrating mill equipped with Blake and Gates crushers, 2 trains of rolls, three 6-compartment Hartz jigs, 4 Wilfley tables, 2 Frue vanners, 4 sizers and a 5' Huntington mill. Property has produced considerable ore in the past, and some high-grade silver ore was shipped by a lessee from the Pandora claim in 1910.

JARILLA CONSOLIDATED COPPER CO.**NEW MEXICO**

Secretary's address: Room 35, 92 State St., Boston, Mass. Mine at Brice, Otero Co., N. M. E. S. Plaisted, pres.; John B. Boss, treas.; preceding officers, I. W. Crozier, John McLean, Geo. W. Kimball and W. W. C. Spencer, directors; W. W. C. Spencer, gen. mgr.; Geo. W. Moffett, supt., mg. engr., chemist-assayer and purch. agt. Organized 1912, under laws of Arizona, capitalization \$2,000,000, shares \$1 par, fully paid and nonassessable; issued, \$1,000,000. Annual meeting, first Monday in December.

Property, 40 claims, about 800 acres, in Jarilla (Silver Hill) district, Otero Co., N. M., carrying sulphide ore in contact deposits between limestone and monzonite porphyry. Vein said to be 3 to 30' wide, 300' to a half mile long and proven to 170' depth, averaging 3 to 5% copper, 2 oz. silver

and \$1 gold per ton. Development by 5 shafts from 30 to 172' and the Harvey tunnel, 165' long.

Company is a merger of and holds the properties formerly owned by the Eureka Mines Cons. Co., Boston Jarilla Copper Co., Amarillo Mining Co. and Eureka Placer Mining Co., whose combined capitalization of \$8,000,000 is reduced to \$2,000,000.

JARILLA COPPER SYNDICATE, INC.

NEW MEXICO

Office: Brice, via Oro Grande, Otero Co., N. M. R. B. Hutchinson, pres.; J. J. Mundy, vice-pres.; T. B. Rains, sec.-treas. and acting mgr.; Norval J. Welsh, cons. engr. Organized July, 1912, under laws of Arizona.

Property, the By-Chance group comprising the Stokes, Butterfly, Buckeye and By-Chance claims, all owned outright, is in the Jarilla district, 4 miles from Oro Grande on the El Paso & S. W. railroad. District shows Paleozoic limestone and shale cut by intrusive masses of monzonite porphyry. The By-Chance claim, the only one operated, has a contact metamorphic deposit of chalcopyrite-hematite-garnet ore lying alongside of a porphyry mass with ore along a fracture zone in the limestone.

Development includes a 130' vertical working shaft with a level at 86' on which the blanket orebody, 12 to 30' thick, is being stoped. A 60' winze from this level is reported to show a second and lower orebody.

Production to Oct. 1, 1913, 6,000 tons of ore shipped to El Paso and Douglas, averaging 2% copper and \$2 gold per ton. Shipments now average 600 tons monthly with returns which just about cover development and operating expenses. Property promising and management good.

JAY GOULD MINING CO.

WASHINGTON

Mine near Chewelah, Stevens Co., Wash. F. C. Bailey, superintendent, at last accounts. A little prospecting was done some years ago, when it was said the property showed copper ore. Presumably idle.

J. BENNETT SMITH MINING CO.

MINNESOTA

Idle. Office: 280 Chestnut St., Kingston, Pa. Mine address: Pine City, Pine Co., Minn. J. Bennett Smith, pres.; Herbert Conyngham, sec.; Edw. Hilles, treas.; Henry Hoefler, gen. mgr., at last accounts. Company owns 500 acres of copper-bearing ground, along Snake river, a mile below Cross lake, in Pine county, Minn. The lands show the western extension of the Keweenaw copper-bearing beds of Lake Superior, the bedded formation having a strike of about N. 20° E., with dip of about 72° S.-E., showing the beds to be on the northern fold of the syncline. One bed shows magnetic deflection of 12 to 18° on surface for a distance of more than 5 miles, and a 560' shaft was started on this bed. There also are pits and shafts of 20', 40', 110' and 150'. The main shaft was abandoned and another shaft started a half-mile east. Several of the amygdaloidal and conglomerate strata, showing native copper, have been proven by test pitting and diamond-drill borings. Company reports having expended about \$50,000 on exploratory and development work since 1879.

JEDWAY COPPER CO.

BRITISH COLUMBIA

Probably dead. Mine near Jedway, Queen Charlotte island, B. C. Property, sundry claims held under \$125,000 bond and lease. Bond probably forfeited, as this section was idle in 1912.

JEFFERSON CALHOUN MINING CO.

COLORADO

Former address: Chicago, and holdings at Russell Gulch, Gilpin Co., Colo. This company was adjudged bankrupt and its property sold under judgment proceedings several years ago. A reorganization is reported to have been effected by R. R. Alsdorf of Central City, Colo., secretary of the new company. The old company was a reorganization of the Wabash

Consolidated Co. Property, 7 patented claims on Quartz hill, whose gold-copper-lead veins are opened by the Newhouse tunnel.

JEROME VERDE COPPER CO.

ARIZONA

Office: 223 Security Bldg., Los Angeles, Cal. Mine office: Jerome, Yavapai Co., Ariz. Truman Berry, pres.; Thos. E. Campbell, vice-pres.; I. Mabbett Sutton, sec.-treas. and mgr., and John L. Gales, directors; Eli Barrett, supt. Organized Dec., 1906, under laws of Arizona, capitalization \$5,000,000, shares \$1, nonassessable; issued, \$3,600,000. Was organized as successor of Verde Queen Copper Co., giving old shareholders \$2,501,000 in stock, which is held by the old company in a single certificate, and is practically escrowed.

Lands, 28 claims, patented, 480 acres, lying east of the United Verde and adjoining the Little Daisy mine of the United Verde Extension. Property shows an iron gossan with outcrops of copper ore on the Verde and Columbia claims. Development is by the 700' two-compartment Columbia shaft, with about 2,500' of workings, showing mainly copper carbonates, with small quantities of oxide and silicate ores, also some sulphide and a little native copper, all slightly auriferous and argentiferous. Average assays were reported, by former management, at 8.4% copper. The mine is wet, and has electric pump, with capacity of 175 gals. per min., working against 500' head.

Equipment includes a hoist, good for 1,000' depth, and a 5-drill air compressor. Commercial current is taken from the Arizona Power Co.

There are a number of mine buildings, and a 35-ton smelter, which was in commission for a short time, 1901-02, producing 2 carloads of low-grade black copper, of about 93% tenor, and a small quantity of matte. The promising disclosures on the Little Daisy mine of the United Verde Extension, adjoining this property resulted in an option being given on the Jerome Verde property until June 15, 1915, to the United Verde Extension Co. This option provides for the payment of \$500 per month and that 100' of work per month shall be performed. Dr. James S. Douglas is to buy 400,000 shares for \$200,000, said amount to be expended on the property under his direction, but agreement is revocable on 30 days' notice. If option is exercised the United Verde Extension Co. will increase its capitalization, giving one-third of the total stock to the Jerome Verde Co., one-third to the old stockholders and one-third to remain in the treasury.

JERSEY VALLEY MINES CO.

- NEVADA

Office: Worcester, Mass. W. Prince Catlin, manager, Battle Mountain, Lander Co., Nev. Property, in Kimberly or Hill Top district, 23 miles from Battle Mountain, comprises the Jersey Valley group, and the Gray Eagle claims, acquired Sept., 1913, from the Gray Eagle Mining Co. Four sets of leasers are taking out ore from the last named claims and the property is being equipped for further development and production.

JESSIE BELLE M., M. & SM. CO.

CALIFORNIA

T. S. and Ray Daulton of Madera, Madera Co., Cal., have reopened the mine under a 4-year lease. Company organized 1902, under laws of Arizona, capitalization \$1,500,000; shares \$1 par. Lands, 3 patented claims, 40 acres, 7 miles from and in same belt as the Copper Queen mine, in Mariposa county. Contains copper carbonate ore with gold and silver values, shipped by the leasers to the Selby smelter in June, 1913.

Development by a 200' main shaft, showing 4 fissure veins, carrying oxide, carbonate and sulphide ores. Has steam power, air compressor and a 30-ton concentrator.

JESUS MARIA DE BAQUERACHIC MINE.

MEXICO

Idle. Mine near the Lluvia de Oro, Batopilas, Chihuahua, Mex. Is an old property with several thousand feet of old workings, showing copper

sulphides, carrying 5 oz. silver and \$2 gold per metric ton. In a remote region and cannot operate profitably without railway transportation.

J. I. C. MINING CO.

UTAH

Merged with Thompson Mining Co., as the Thompson Quincy Consolidated Mining Co. Mine near the Daly-West and Daly-Judge at Park City, Utah.

JIMULCO MINING CO.

MEXICO

Mine address: Otto, Coahuila, Mex. Otto Wahrmund, pres.; Otto Koehler, vice-pres.; S. G. Newton, sec.; Arthur L. Tuttle, gen. supt.; John D. Moore, mine supt. Organized 1901, under laws of Texas, capitalization \$500,000, shares \$50 par, increased, March, 1906, and reduced, 1908, to \$1,000,000, shares \$100 par. To end of 1910 paid dividends aggregating \$965,000, as follows: \$55,000 in 1902; \$125,000 in 1903; \$285,000 in 1905; \$150,000 in 1906; \$200,000 in 1907; \$30,000 in 1908; \$60,000 in 1909; \$60,000 in 1910; \$10,000 in 1911; \$30,000 in 1912.

Property, 111 hectares, including the Defensa, Reforma, Esperanza and San Juan properties, carrying argentiferous copper ores, oxidized ores predominating, as replacement deposits in limestone. Development is by a 500' main shaft and 10 prospecting shafts of 100 to 150' depth, with 6 main tunnels and 4 short prospecting tunnels, aggregating about 1 mile in length. The mine has about 10 miles of workings showing good ore in the bottom levels. Ore is shipped to the Aguascalientes smelter for reduction, and shipments in 1912 were 5,100 tons averaging 6.1% copper and 3 oz. silver.

Equipment includes gasoline and electric power, with an electric hoist. There is a 5-mile private narrow-gauge railway connecting with the Mexican Central line, at Otto.

Production, at end of 1910, was about 25 metric tons daily, and approximately 1,635,000 lbs. fine copper and 64,000 oz. silver in 1909. Production, 1912, was 684,420 lbs. Property considered valuable and management good.

JOCOMO MINE.

COLORADO

Steiner Bros., owners, Rosita, Custer Co., Colo. Property shows a deposit of copper ore developed by shaft and drifts and equipped with steam power.

JOE CREEK COPPER CO.

CALIFORNIA

Idle. Mine address: Hutton, Siskiyou Co., Cal. Is one of the many prospects of the copper belt of northern California, whose owners believed a copper outcrop could be made to pay cost of development and equipment from ore mined from shallow workings. Lands, apparently owned formerly by Copper King Mining Co., lying between the Blomfield group and the Blue Ledge mine, have opencuts and crosscuts developing the mine to depth of 400'. Property is said to carry several large orebodies, ranging 5 to 8% in copper tenor and \$8 per ton in combined gold and silver values, an estimate considered excessive.

JOHNNY BULL MINE.

NEW MEXICO

W. H. Henry, Boston Road, New York, N. Y., owner; David L. Créswell, Steins, Grant county, N. M., purch. agt. Property south of Steins Pass, between S. P. and E. P. & S. W. R. R., on western slope of Peloncillo range, shows a contact deposit between limestone and a N.-S. monzonite dike. The ore is said to average 5% copper and to run high in lime and iron.

Development includes 2 old shafts 100' and 150' deep, with 1,000' of work, exposing 2 parallel veins, each 125' wide. Property, idle since Feb., 1900; was formerly owned by the Johnny Bull Copper Mining Co., whose charter was forfeited in 1902.

JOHNSON COPPER DEVELOPMENT CO.

ARIZONA

Office: Frankfort, Ky. Mine address: J. T. Tange, mgr., Johnson,

Cochise Co., Ariz. Henry S. Krug, St. Louis, Mo., pres.; Ralph R. Wilson, vice-pres.; E. H. Elliott, sec.-treas.; preceding officers, P. S. Head, Hon. A. A. Hazelrigg, J. A. McKim; Hon. Baily D. Berry, Hon. A. C. Van Winkle and Wm. Deckeraw, directors. Organized, March 13, 1908, under laws of Arizona, capitalization \$2,000,000, shares \$1 par, nonassessable; issued, about \$1,230,000. Annual meeting, second Tuesday in October.

Lands, 8 claims, 3 fractional, unpatented, area 123 acres, known as the Climax group, located in center of the Johnson camp, between the Peabody, Peacock, Republic and Black Prince mines. Claims show granite and limestone, with replacement deposits carrying malachite, chrysocolla, bornite and chalcocite, averaging 4% copper and 5 oz. silver per ton for the several thousand tons thus far developed. Orebody has a flat dip, averaging 32°, and is about 2' wide on the 250' level. Development by 250', 1½-compartment working shaft, said to be bottomed in bornite disseminated in limestone. The 100' level has about 500' of crosscuts and drifting, much of it in ore, but ground is leached and broken. The 250' level has north and south drifts, on a 2' vein, carrying a very narrow streak of 40% ore with 20 oz. in silver. Company averages 15 men at work and is developing the vein in the 250' level hoping to find a large orebody.

Equipment includes a 40-h. p. Fairbanks & Morse gasoline hoist, an air compressor, etc. There are 5 buildings, including engine room, smithy and warehouse. Management plans deepening vertical shaft to 1,000'.

JORDAN GROUP.

ARIZONA

Address: F. Jordan, owner, Continental Mine, via Miami, Ariz. Property comprises a group of claims in the Gold gulch section, about 1¼ miles west of the Continental mine and 5 miles from Miami. Claims cover an area of limestone traversed by an iron oxide zone 200' wide that is largely hematite, but shows copper ore as a casing between iron ore and limestone.

Development consists of a 140' and 80' tunnel. Samples 20' from surface are reported to show 1.15% copper, 9 oz. silver and \$3 gold per ton. Property has a spring.

JOSEFINA MINE.

MEXICO

Owned by Chenoweth Bros., of Nogales, Ariz. Property 5 miles from Santa Cruz station, on the Cananea branch of the S. P. R. R. and 40 miles northwest from Cananea. Is shipping to the Douglas smelter. Property is a new one and has only been worked since the beginning of 1913.

JOSEPH WILKINSON MINES.

ARIZONA

Address: Wenden, Yuma Co., Ariz. Property near Cunningham Pass, Harcuar range northwest of Wenden, shows vein in gneiss and schist carrying high-grade gold-silver-copper ores. Shipments were made weekly throughout winter of 1912-13. Property bonded to Bisbee syndicate, Aug., 1913. Not regarded as a promising property.

JOSEPHINE COPPER MINING CO.

MONTANA

Probably dead. Letters unclaimed at Stark, Missoula Co., Mont. Daniel McGinnis, pres.; Claus P. Anderson, sec.-treas.; preceding officers, Forest D. Fraser and Fred Link, directors; Jas. McGinnis, mgr., at last accounts. Organized 1907, under laws of Montana, capitalization \$1,000,000, shares \$1 par. Lands, 8 claims, patented, 160 acres, on Nine Mile creek, 14 miles from the railway, at Houston. Mine has a 190' shaft, showing galena and chalcopryite at bottom, claimed to give average assay of 21% copper, 3 oz. silver and \$2 gold per ton, which figures are considered too high. Equipment includes a 6-h. p. gasoline hoist and various mine buildings.

JUANITA MINING CO., S. A.

MEXICO

Office: Sellwood Bldg., Duluth, Minn. Operating address: Bisbee, Ariz. Martin Pattison, pres.; Byron M. Pattison, vice-pres. and mgr.;

Lemuel E. Shattuck, sec.-treas. Lands about 1,000 hectares, known as the Juanita group adjoining the Calumet & Sonora, 3 miles northwest of Cananea, traversed by several narrow fissure veins in volcanic tuff beds. These veins carry small oreshoots with argentiferous chalcopyrite, galena and sphalerite with some ore assaying up to 15% copper and 30 oz. silver, but values as developed are mainly in lead and zinc. No 1 shaft is 220' deep and there also is a 75' shaft. Work suspended 1912-13 owing to political disturbances in Mexico.

JUANITA MINING & MILLING CO.

ARIZONA

Office: Phoenix, Ariz. Mine at Prescott, Yavapai Co., Ariz. M. Dwight Jennings, pres.; W. S. Heflin, vice-pres.; D. A. Seaman, sec. and gen. mgr.; E. J. Bennett, treas.; preceding officers, B. F. Peters, Otto Kring and E. Payne Palmer, directors. Organized April, 1905, under laws of Arizona, capitalization \$1,500,000, shares \$1 par, nonassessable; issued, \$1,200,000. Annual meeting, first Tuesday after second Monday of April.

Property, 16 claims, unpatented, area 300 acres, and a 5-acre mill site about 4 miles from the Senator mine in the Hassayampa district, about 17 miles south of Prescott. Management reports the property to carry 11 fissure veins in porphyry and schist with 4 under development of 1 to 60' width, traceable 1,000 to 3,000' carrying auriferous and argentiferous copper sulphides assaying 2 to 10% copper, 1 to 100 oz. silver and \$1 to \$1,700 gold per ton. Apparently the main vein is of 8' average width.

Development is by a 210' shaft and several tunnels from 45 to 450' long, with 3,500' of workings estimated, 1913, to have blocked out 5,000 tons of ore with 25,000 tons in sight. Equipment includes 25-h. p. hoist, 2-stamp mill, 7 tons capacity. Production, 1912, was 50 tons of ore averaging \$9.50 per ton. Property is leased to D. A. Seaman until Nov., 1916, leaser to develop mine and install machinery leaving not less than a 20-stamp mill and pay royalty on all ore taken from opencuts and stopes.

JULIAN MINING & MILLING CO.

UTAH

Idle. Office and mine: American Fork, Utah Co., Utah. Jas. Chipman, Jr., pres.; Wm. Thornton, vice-pres.; J. E. Bennett, sec.-treas. Organized Aug., 1909, under laws of Utah, capitalization \$50,000, shares 5 cts. par. Apparently succeeded a company of same title organized under laws of Nebraska, having an office at Geneva, Neb., which lost its charter 1909. Lands, 5 claims, unpatented, showing gold, silver and copper ore.

JUMBO EXTENSION MINING CO.

NEVADA

Office: Goldfield, Nev. E. S. Van Dyck, pres., treas. and gen. mgr.; Ben Gill, sec.; Chas. D. Olney, asst. sec.; preceding officers, A. A. Newcomer and T. G. Lockhart, directors. Organized May, 1904, under laws of Arizona, as successor of the Jumbo and Vernal Extension Mining Co., capitalization \$1,250,000, shares \$1 par; issued, \$971,158. Securities, Transfer & Registrar Co., New York, and Registrar Security Co., San Francisco, transfer agents and registrars. Annual meeting second Monday in July. Receipts for 1912 were \$124,318, being \$17,743 earnings, balance being cash, carried forward from 1912.

Property, 8 claims, 70 acres, in Goldfield district, Esmeralda Co., Nev. By agreement with Goldfield Consolidated Co., this company received one-half the net proceeds of ore mined from vein apexing on Consolidated territory and passing through the Poleverde claim and has right to all proceeds of other ore in claim.

The ore carries gold, silver and copper which can be concentrated but not cyanided. Ore is spotty and averages but \$7 per ton, which is milled with 70% recovery. Company operates 1 shift of 12 men and produced 4,644 tons of ore in first 3 months of 1913, at a cost of \$174 per ton, doing

716' development work. The workings show 3 orebodies on footwall, middle and hanging wall respectively of the quartz mass. The first named assays \$3.83 to \$6.24 for a width of 10'.

Operations for 1913 show 3,317 tons milled at an expense of \$4.02 per ton, or \$13,332, with a recovery of concentrate valued at \$15,979, netting \$13,597. The reduction plant is too small for profitable operation on this class of ore.

JUMBO MINE.

ALASKA

Owned by Alaska Industrial Co., at Sulzer, Prince of Wales island, Alaska.

JUMBO MINING CO.

IDAHO

Office: Wallace, Idaho. John Carlson of Gem, J. N. Morgan of Mace and John Wood, C. E. Conn and Chas. Minch of Gem, Idaho, incorporators. Organized Aug. 28, 1913, capitalization \$1,000,000, shares \$1 par.

JUNE COPPER CO.

WASHINGTON

H. S. Spedden, superintendent, Chewelah, Stevens Co., Wash. Incorporated June, 1913, under laws of Washington, by R. C. Toole, L. B. Cottingham and W. L. Hansom. Presumably owns the June-Echo mine near Chewelah, Stevens Co., Wash., where a 40-h. p. gasoline hoist has been installed and a 200' shaft is now being sunk. Vein shows copper-silver ore.

JUNGLE MINE.

SOUTH DAKOTA

Owned by Custer Peak Mining Co. and described thereunder.

JUNIATA GOLD & COPPER CO.

ARIZONA

Office: 315 South Broadway, Los Angeles, Cal. Mine address: Parker, Yuma Co., Ariz. P. W. Powers, pres.; E. S. Field, vice-pres.; Dalton S. Patterson, sec.-treas.; H. B. Ailman, supt. Organized Oct. 29, 1907, under laws of Arizona, capitalization \$1,000,000, shares \$1 par. Lands, 10 claims, area 200 acres, lying between the Gray Eagle and Carnation mines, in the Seneca district about 9 miles northeast of Parker, on the east side of the Colorado river. Claims show gray micaceous schists with interbedded limestone. The schists dip about 45° and are cut by shear zones in which copper ores occur. Development consists of 200' shaft with 2 prospect shafts reported to expose 8' of ore carrying 4% copper and \$9 gold per ton. A second vein said to be 18' wide is reported to carry 2½% copper and \$6 gold. Property is as yet a prospect.

JURY COPPER MINES, LTD.

ONTARIO

Idle. Mine near Dean Lake, Algoma, Ont. Organized Dec. 5, 1906, under laws of Ontario, capitalization \$1,000,000. Lands, in vicinity of Dean lake, have a 46' shaft, showing chalcopryrite. Company inactive for several years and presumably dead.

KALAMAZOO COPPER MINING CO.

COLORADO

Property formerly held at Pearl, Larimer Co., Colo., abandoned 1912, title forfeited and apparently moribund. See Vol X.

KAMLOOPS COPPER CO.

BRITISH COLUMBIA

General office: 609 First National Bank Bldg., Duluth, Minn. Mine address: Kamloops, Yale district, B. C. E. G. Wallinder, pres.; W. H. Eaton, vice-pres.; Louis Ramstad, treas.; J. J. Eklund, Gust. Carlson, Reiner Hoch, J. A. Kennedy, Otto Johnson, directors; W. W. Blackshaw, sec., 1412 Tower Ave., Superior, Wis. Company organized Sept. 7, 1909, under laws of Arizona, capitalization \$3,000,000, shares \$10 par, part paid; 105,000 issued, none preferred. Has issued \$210,000, 6% bonds.

Lands, 14 claims, 2,168 acres, 355 acres mineral land, including the Iron Mask mine, 4 miles southwest of Kamloops. The Iron Mask shaft is sunk on a shear zone, mineralized for 20 to 30' in width, with segregations of better grade ore forming a paystreak of variable width, carrying chalcopryrite, associated with magnetite in a chloritic or gangue containing ortho-

clase intercrystallized with copper sulphide. The country rock is a diorite with smeary, basic patches of gabbroic material. The Iron Mask orebody averages 28' in thickness, but is lenticular in shape. The "vein" is opened for 1,300' in length and 611' in depth. The ore averages 2.9% copper, 0.5 oz. silver and \$1.43 gold per ton. It is troublesome to concentrate by ordinary methods owing to its chloritic and quartz-orthoclase gangue.

This property shows several orebodies besides the Iron Mask, all of them due to "igneous aftereffects," and occurring in fresh diorite filling fissures, as replacements along fissures and in patches, consisting of orthoclase, chlorite epidote and other secondary pneumatolytic minerals, with interlocked chalcopryrite, pyrite, magnetite, etc.

The Erin orebody shows excellent ore and numerous pits at various points on the property all show ore.

Development includes the 611' Iron Mask shaft and some 9,000' of workings, the 165' Erin shaft with short drifts, the 50' Lucky Strike shaft and 3 other prospect shafts.

Equipment includes 2 boilers aggregating 300 h. p., a 250-h. p. Corliss tandem-compound condensing engine, 6' double-drum hoist, 3 air compressors of 1,300 cu. ft. capacity, good for 15 drills and an electric-light plant. There also is a sawmill. Transportation is by a good wagon road though with steep grades, leading to the railway siding below Kamloops. The management plans a 2½-mile tram, having a drop of 1,100'.

Company reports mining costs at \$1.12 and concentration costs at \$0.28 per ton, which low figures are regarded as a result of not charging up general expenses, development, etc., to costs.

Property is valuable but needs churn drilling as Iron Mask mine alone is not a sufficient basis for a big company, and surrounding ground, while mineralized, is unproven. It may show a large tonnage of low-grade ore susceptible to concentration by froth flotation. There is an old 160-ton concentrating mill now being reconstructed. The old 50-ton smelter which smelted 2,644 tons of 5% ore to 50% copper matte, is practically scrapped and useless. Production of property to end of 1912 was about 1,500,000 lbs. of copper. Property not worked in 1912, company husbanding its resources to meet payments on the property. Operations in 1913 have been confined to ore extraction from the Erin shaft and to cleaning up the old Iron Mask workings. It is understood that the English corporation has extended the time for further payments on the property.

KAMLOOPS MINES, LTD.

BRITISH COLUMBIA

Office: 151 Coronation House, 4 Lloyds Ave., London, E. C., Eng. Company in hands of trustees and working organization abandoned, as sole property is the Iron Mask mine and group at Kamloops, B. C., under lease and bond to the Kamloops Copper Co. See Vol X.

KANSAS COPPER CO.

ALASKA

Address: W. G. L. Totten, Buckhannon, W. Va. Incorporated by W. G. L. Totten, J. C. McWhorter, E. W. Martin, U. G. Young and G. F. Smith, to operate copper and other mines in Alaska.

KAUFMAN & RANDALL MINE.

NEVADA

Charles Oberg, leaser, Yerington, Nev. Property in west side of Yerington district, Lyon county, Nev., shows 12 to 15' of oxidized ore containing cuprite from which recent shipments to the Wabuska smelter yielded \$615.80 per ton net.

KAY COPPER CO.

ARIZONA

S. J. Tribolet, pres. and mgr., Cave creek, Maricopa Co., Ariz. Company owns the Starkweather mine and claims on the Agua Fria river, at the mouth of Black Canyon creek, 50 miles north of Phoenix and some 9

miles from Cave creek. The reports indicate that this company has recently developed a large body of high-grade ore. The main shaft, 340' deep, is said to show 17' of 10% ore on the 260' level and 8' of gray copper ore, averaging 17.7% copper, on the south drift of the 300' level. A new shaft is now being sunk 1,200' north of present working shaft. Company has shipped 1,000 tons of its high-grade ore to the Swansea smelter by auto truck and trailers to Glendale. Reported to have an orebody that is in places 30' wide with 10,000 tons blocked out and to be shipping 3 to 5 cars per month of ores netting \$1,500 to \$2,500 per car. Property is now under option.

KAY MINE SMELTING CO. VIRGINIA

Address: R. F. D., No. 2, South Boston, Va. Z. L. Kay, pres. and gen. mgr.; J. R. Wilbourne, vice-pres.; H. P. Wilder, sec.; H. J. Watkins, treas. and Jas. S. Sebree, directors. Organized Aug. 8, 1905, under laws of South Dakota, capitalization \$1,000,000, shares \$1 par, 525,000 shares paid Z. L. Kay for property; 600,000 issued.

Company owns 261 acres, comprising the Kay farm at the north end of the Virgilina district, 9 miles from South Boston, in Halifax county, Virginia. The tract shows lenticular quartz veins enclosed in schistose rocks formed from old volcanic tuffs and andesite, of the type characteristic of the Virgilina district. Veins consist of white quartz and carry primary copper glance below the water level with carbonates, oxides and some native copper in the oxidized zone. The vein varies from 3 to 6' in width and is said to be traceable 1 mile.

Development is by two 50' shafts, said to show ore averaging 4.8% copper with small values in gold and silver. Owner estimates 1,000 tons in sight. There is a 15-h. p. gasoline hoist and a 1-drill compressor. A trial shipment of ore has been sent to the Reid electric smelter, Newark, N. J.

Management plans sinking shaft to 300' level and crosscutting the veins at that depth, but as the money is supplied by local residents, the work is contingent upon their ability to supply the funds. As work has been intermittent since 1905, and property now has but 109' of workings, the outlook is not very hopeful. The future of the entire district, including this property, depends upon the use of some cheap method of concentration, which froth flotation apparently supplies.

KEARSARGE MINES. MICHIGAN

Owned by Osceola Consolidated Mining Co., at Kearsarge, Houghton Co., Mich.

KEATING GOLD MINING CO. MONTANA

Office: Room 201, Board of Trade Bldg., Duluth, Minn. Mine office: Radersburg, Broadwater Co., Mont. J. H. Barnes, pres.; Jesse B. Roote, vice-pres.; Mc. B. Graves, supt.; R. E. Gilham, mine supt. and engr.; C. R. Vorck, chemist. Organized Oct. 26, 1908, under laws of Montana, capitalization \$1,250,000, increased 1909, to \$2,000,000, shares \$5 par; issued, \$1,875,000. Is said to be controlled through stock ownership by the Radersburg Consolidated Mining Co. Had a \$50,000 bond issue refunded, 1911, by issuing \$125,000 6% bonds, due April 15, 1914, convertible into stock at par at option of holder, there being 25,000 shares stock unissued in the treasury to provide for such conversion.

Property, 10 claims, including former holdings of Montana Leasing Co. The mine was a gold producer from oxidized ores above the 100' level, and is popularly reported to have produced about \$1,500,000 under former ownership, work having been confined to the oxidized zone until property was taken over by lessees, 1906. The vein is 4 to 8' wide and is of 2,200' known length. There also are transverse fissures, some of which dip at 60° and

are well mineralized. The mine has auriferous and slightly argentiferous copper ore, with increasing copper values at depth. Ore is pyrite with rare chalcopyrite, bornite and tetrahedrite associated with calcite and silica and the mine has shipped some ore up to 17% in copper tenor with good gold values.

Development is by the 400' old shaft and the new 800' shaft, with levels at each 100' depth, the workings aggregating 3 miles in length. An ore shoot on the 800' level is reported to average \$84 gold and 4% copper, but ore as a whole averages 1.4% copper, 0.6 oz. silver and \$20 gold per ton, with 38% iron and 24% silica.

Equipment includes a 600-h. p. electrical plant installed 1910, with hoist and 2,500 cu. ft. capacity air compressors. Ore is teamed 12 miles to Toston, the nearest rail point on the Northern Pacific line, but it is hoped that rail connection from Three Forks to Radersburg will be completed this year.

Ore is shipped to the Washoe and Pittsmond smelters. For the year ending May, 1909, production was \$166,178.96 gross, and for the calendar year 1909 the mine shipped 120 carloads of ore, netting about \$17 per ton. During Oct., 1910, the mine shipped 40 carloads netting about \$19 per ton, said to have netted the company \$5,000 above all expenses, and early 1911, the mine was shipping 2 carloads daily, mainly from the 400' and 500' levels. Net smelter returns were about \$17 per ton in 1909; \$21 per ton in 1910, and in Feb., 1911, estimated net profits were about \$25,000, on shipments of 27 carloads, netting an average of \$925 per car. Production has averaged 100 tons a day of \$22 ore throughout 1912 and 1913. Copper production for 1912 was 1,080,000 lbs. and production for 1913 is estimated at 1,500,000 lbs. Property considered good and management able. Stockholders have been disappointed for years by the company's secrecy. Very optimistic opinions are expressed and steady shipments made, but no dividends have been declared and no details given of income and expenditure.

KELLER & INDIANA CONS. SMELTING CO. WASHINGTON

Bankrupt. Smelter sold for \$2,686 at sheriff's sale, 1911, to H. J. Lefevre of Spokane. Fully described Vol. X. Formerly at Keller, Ferry Co., Wash.

KELLY MINE. NEW MEXICO

Located at Kelly, Socorro Co., N. M. Owned by Tri-Bullion Smelting & Development Co.

KELVIN-SULTANA COPPER CO. ARIZONA

Office: 339 Monadnock Blk., Chicago, Ill. Mine office: Kelvin, Pinal Co., Ariz. A. H. Westfall, pres.; Geo. P. Baldwin, vice-pres.; Neil McMillan, sec. and gen. mgr.; W. Espy Curtis, treas.; preceding officers, L. Ogden Wadleigh and Dr. J. A. Glenn, directors; H. C. Erman, engr. Organized April 19, 1910, under laws of Arizona, capitalization \$3,000,000, shares \$1 par, nonassessable; issued, 2,865,824 shares. Company was a reconstruction of the Sultana-Arizona Copper Co. Company was financed by the Baldwin Syndicate of Chicago and the entire floating indebtedness eliminated.

Property, 21 claims and 3 fractions, total 530 acres; all patented but 2 claims and fraction, in Ray-Kelvin district. Pinal county, Ariz. Company also owns 30 acres of gold and silver lands in Ures district of Mexico.

The Arizona mines were formerly known as the Riverside and Bryan groups, and are across the Gila river from and 1½ miles southeast of Kelvin. Management reports 21 contact deposits, between granite and diorite, of which 5 veins have been developed; reported as 18" to 6' wide, and estimated to average 5' in width, with a generally northwest trend. The property also was said, formerly, to show a 6' vein carrying chalcopyrite in

the lower workings, from which shipments to the Humboldt smelter returned 8.7 to 10.6% copper. Average tenor of ore in all veins is estimated by the company as 6% copper and 3 to 4 oz. silver per ton.

Development by 6 shafts, the deepest being 400', and the Hunter and Agnes tunnels. About 6,000' of underground work has been done and is said to show widening of veins at depth. A 165' shaft on Diamond Joe claim is reported by Ralph Harris, mining engineer, to cut cuprite, chalcocite, chalcopyrite and pyrite. The Westfall, or main working 3-compartment shaft, is now down 400' and in July, 1913, vein No. 2 was cut. Vein No. 2 shows 6' of 4% ore and in a winze from the 300' level 3' of 6% ore. On the Bryan claim, a 175' incline shaft has exposed shipping ore, reported to be very rich.

Equipment includes a new 575-h. p. oil-burning electric plant, in commission, March, 1913. Management plans a 1-mile aerial tram, across the Gila river, to the railway station of Kelvin, and a concentrator of 200 to 300 tons daily capacity. Production of old company, to end of 1909, was 522 tons of ore, yielding \$12,450. Production was 45,838 lbs. fine copper and 653 oz. silver in 1907. Daily shipments of 20 tons to the Hayden smelter, began this summer. Shipments to date average 9% copper.

Company's financial campaign is not favorably regarded and its house organ "Financial Converse" uses the methods which have led so many promoters into trouble.

KEMP-KOMAR COPPER MINING CO.

WASHINGTON

Idle and probably defunct. See Vol X. Mine at Loon Lake, Stevens Co., Wash.

KENNECOTT MINES CO.

ALASKA

Office: 165 Broadway, New York. Mine address: Kennecott, Alaska. Silas W. Eccles, pres.; Stephen Birch, vice-pres. and gen. mgr.; W. E. Bennett, sec.; E. S. Pegram, treas.; preceding officers and John N. Steele and Wm. Pierson Hamilton, directors; J. Carson, mine supt.; Oscar Nordquist, mill supt.; W. H. Seagrave, mgr. Organized Nov. 27, 1906, capitalization \$2,500,000, shares \$10 par; all issued. Total dividends to date \$4,000,000, all in 2 years. Annual meeting, third Friday in March.

The Kennecott Mines Co. is the name of the Guggenheim-Morgan corporation owning the celebrated Bonanza mine in the Copper River country, Alaska. It is unofficially directed by the A. S. & R. Co. of New York.

The Bonanza mine has one of the most remarkable orebodies ever found by a prospector. This great mass of high-grade ore, much of it carrying 60% copper, outcrops on the crest of a precipitous mountain overlooking the Kennecott river, a tributary of the Chitina, which flows into Copper river. In 1912 the ore reserves were estimated at 30,000 tons of 50 to 60% ore and 54,000 tons of 30% ore carrying \$13 per ton in silver, with 30,000 tons of broken ore as a talus pile beneath the outcrop.

Recent development has indicated non persistence in depth, so the mine will not flood the world with cheap copper as was at one time foolishly believed.

The ore outcrops as massive chalcocite averaging about 50% copper and 0.2 oz. silver to each per cent copper. It is probable that this is primary ore and there are no large masses of oxides, or carbonates present as glaciation and active erosion prevent the formation of an oxidized capping.

The company owns the Bonanza and Jumbo mines, with 52 patented claims, and a total of 3,240 acres, all in the Valdez district, on and near Bonanza mountain. The property shows Nicholai greenstone, consisting of a number of basaltic flows of lava, a hard closed grained rock considerably altered and in places amygdaloidal, varying in color from brown to

light green. The greenstone is overlaid by massive beds of Chitstone limestone of Triassic age, with bedding planes parallel to the flow planes of the lava, the limestone being of a bluish color, weathered to gray at the surface. There also are diabase and andesite intrusions and dikes.

Ore occurs in more or less irregular replacement masses and in a fault zone, the orebodies being more or less parallel to the vertical fault planes, though the ore follows, to some extent, minor fault planes, as well as the bedding planes of the limestone making stockwerks and irregular masses in the crushed limestone. The outcrop is 20 to 40' wide, with an average of about 25', and is something over 400' in length, the southern half showing 2 nearly parallel bands of chalcocite, 4 to 10' in width, separated by about 10' of limestone, showing breaks in places, and at the northern end of the outcrop the chalcocite bands give place to stringers and interlacing seams of chalcocite and azurite, which thin out as they follow the vein northward and fade out as they pass into barren limestone.

In addition to the Bonanza outcrop there is a large amount of ore in the talus, or slide rock, broken off from the outcrop. This mass of broken ore and rock is about 300' wide and extends for about 500' or more down the slope from the outcrop, varying from 3 to 20' in depth. A number of testpits, sunk to the outcrop, showed an average of 4' depth, with an average assay of 13% copper, this including both boulders of chalcocite up to 200 lbs. in weight and barren limestone. Ore is extracted from the slide by a system of cuts. Two grades of ore mined with 70% and 14% copper, respectively.

The mine is developed exclusively by tunnels from 100' to several hundred feet in length. The highest tunnel, at an elevation of 6,200' above sea-level, extends through the vein, near the southern end of the outcrop, from the western face of the ridge, and there is a small system of workings from the eastern slope of the ridge, further north, the latter comprising an upper tunnel extending through the ridge, and a longer lower tunnel of about 300' length, directly underneath, with an 80' winze and an intermediate level running north and south. The mine now has about 6,000' of workings.

The Jumbo mine is also being worked and is reported, 1913, to show good ore, but not the great shoot of high-grade ore reported in the newspapers.

The Bonanza mine is connected with the mill at the lower camp by a Bleichert aerial tram, in 2 sections, the upper of 7,000' and lower of 8,000', with a drop of 4,000'. The tram line has 40 towers, longest span 1,500', with ore bins at both terminals, and has an estimated hourly capacity of 25 tons. The lower camp has the mine buildings, power plant and mill. Equipment includes a small steam plant and an air compressor. Buildings include a bunk house, mess house, assay office and 10,000' sawmill.

The concentrator installed in 1911, is of 250 tons daily capacity, and was operated throughout 1912. Rich ore is hand-sorted, and lower grade ores, though of excellent average tenor are being concentrated in the mill and ore and concentrates shipped to the Tacoma smelter.

Owing to the inaccessibility of this mine development was accomplished under very great disadvantages and at phenomenally heavy cost, profitable production being impossible without transportation facilities. The Guggenheim interests have constructed the Copper River & Northwestern railway, at a cost of about \$20,000,000, this line of 195 miles length starting at Cordova, on the sea, and ending at the lower camp, having had to cope with tidal, river and glacial floods, blizzards and other difficulties inseparable from railway operations in an extremely mountainous country near the

Arctic circle. This line was completed April, 1911, when ore shipments were begun.

The press has been filled with misinformation regarding this property, and the Guggenheim operations generally in Alaska. These fabulous stories have fallen mainly under 3 heads, 1 being the phenomenal size and value of this mine, another group of fairy tales referring to the phenomenal cost of developing the mine and building the railway, sufficiently large without exaggeration, while a third lot of stories covered, in great detail, the fabulous value of the coal and copper holdings of the Guggenheim interests. The railway undoubtedly has been very expensive and has been rendered more costly in construction and operation by the obstructive tactics of the Federal government, which has denied the company the right to mine coal in Alaska, work which would have resulted in great benefit to the public, as well as to the Guggenheim interests, and it is now necessary to import British Columbian coal, at a cost of \$12 per ton, instead of mining coal on the ground, thanks to the more radical "conservationists," who seem to believe that the use of any natural resource by any important business interest, for the benefit of the present generation, is nothing short of criminal. The Bonanza mine probably is the highest grade copper mine in the world, but unless additional orebodies are found, which is possible, the total amount of copper in the Bonanza mine is insufficient to render it more than a producer of the third rank, not even comparable with such mines as the Wolverine and Mohawk in the Lake Superior district though yielding very large dividends which can continue as long as the bonanza ores last.

KENNEDY CONS. GOLD MINING & MILLING CO. NEVADA

Office: Yerington, Lyon Co., Nev. Mine at Buckskin, Douglas Co., Nev. W. C. Pitt, pres.; W. T. Campbell, vice-pres.; E. H. Whitacre, sec.; Lyon County Bank, treas.; Geo. F. Willis, T. Ebert, F. E. Baker and F. C. Biddleman, directors. Organized May 16, 1906, under laws of Arizona, capitalization \$1,500,000, shares, \$1 par, nonassessable; 1,000,000 promotion and 500,000 treasury stock; issued, 1,039,000. Annual meeting, second Tuesday in May. Property now leased to Union Copper Co., office at Buckskin.

Property, 7 claims, 110 acres, patented, in Buckskin district, Douglas Co., Nev., developed by 3 shafts, 90', 147' and 220' deep and by one 240' tunnel, said to expose some large bodies of ore, mostly sulphides with gold, silver and copper. Mine is 4 miles from Nevada Copper Belt railroad and has power line within 1 mile.

KENYON MINING CO. UTAH

Probably dead. Letters unclaimed at Salt Lake City, Utah, and Eureka, Juab Co., Utah. J. E. Galigher, pres.; H. B. Blades, vice-pres.; Valentine S. Snow, sec.-treas., at last accounts. Property in the eastern part of the Tintic district.

KEREMEOS COPPER CO. BRITISH COLUMBIA

Idle. Mine near Keremeos, East Yale district, B. C. Dan. Schultz, pres.; Henry M. Stack, vice-pres. Lands, 3 claims, 2 miles from Keremeos, the nearest rail point, having a vein of 14' reported average width, opened by 3 tunnels, the Spar tunnel being 270' long, with about 1,500' of workings. Shut down several years and presumably out of business.

KETTLE RIVER MINE. WASHINGTON

W. S. Bliss, manager, at last accounts. Mine near Orient, Ferry Co., Wash. Development by shaft reported to show good milling ore; 50-ton concentrator on property. Ore is a complex mixture of copper, lead and zinc sulphides with gold and silver values. Company proposes sinking shaft 50' below 200' level to block out ore.

KEWEENAW COPPER CO.**MICHIGAN**

Office: Calumet, Mich. Mine near Mandan, Keweenaw Co., Mich. Thos. F. Cole, pres.; Spencer R. Hill, vice-pres.; Capt. Thos. Hoatson, second vice-pres. and mining director; Chas. A. Wright, Jr., sec.-treas., and Capt. Jas. Hoatson, directors; W. J. Uren, mine supt.; John C. Shields, railway supt.

Organized March 13, 1905, under laws of Michigan, capitalization \$10,000,000, shares \$25 par; issued, \$5,000,000; paid in, \$16. Last assessment was \$1, Jan., 1913. Controls, through stock ownership, the Phoenix Consolidated Copper Co., Washington Copper Mining Co., and Keweenaw Central Railroad Co. Total expenditures, exclusive of money furnished for construction of the railway, were \$636,041 to end of 1912. Company ended 1912 with cash and accounts receivable of \$207,486 and accounts payable of \$16,926. Has about 2,300 shareholders. American Trust Co., Boston, registrar; City Trust Co., Boston, transfer agent. Annual meeting, second Tuesday in February.

Lands are about 25,000 acres, mainly mineral lands, heavily timbered with maple, birch, cedar and oak. The tracts are in 3 main groups, carrying the strike of the Keweenaw mineral belt for about 14 miles, including practically all of the amygdaloidal and conglomerate cupriferous beds of the district, as well as numerous copper-bearing cross fissures. Lands are in T. 58 N., of Rs. 27, 28 and 29 W., and include the tracts formerly owned by the Aetna, Copper Harbor, Empire, Girard, Hanover, Keweenaw, Mandan, Medora, Pennsylvania & Boston, Resolute and Vulcan companies, in addition to lands controlled through stock ownership in subsidiary corporations.

The company's lands carry nearly 2 miles of water frontage on either side of the Montreal river, including Fish cove, 1 mile east of the river's mouth, which might be made a fair harbor at comparatively small expense. The lands also include 5 miles of the course of the river, on both banks, and, with other holdings, give the company the entire water-frontage of Mosquito lake, making possible the development of a great water power, with a hydro-electric installation at the mouth of the river. There is a mill site on Bete Gris bay, at the mouth of the Montreal river, having about 5 miles of water frontage.

The company also owns the Lac La Belle, or Mendota, ship canal, 1 mile long, connecting Lac La Belle with Lake Superior. This canal has a 14' channel, and leads to a splendid haven that should be made a harbor of refuge.

Most of the old mines secured by the company were prospects only, but the Aetna had a recorded production of 140,881 lbs. fine copper, secured 1863-73, and the Resolute mine had a 379' shaft, with about 2,000' of workings.

The Medora mine, opened about 1860, had 3 old shafts, about 100' apart, deepest 140'. The Medora amygdaloidal bed, traversing lands of the company for about 4 miles, lies immediately under the Allouez conglomerate, and outcrops several hundred feet north of the Montreal river bed. The Medora, about 12' in average width, is a soft chocolate-colored amygdaloid, carrying considerable prehnite, calcite and quartz, in connection with fine stamp copper and occasional heavy copper, a 30" paystreak along the foot-wall carrying some barrel work, the bed as a whole being bunchy.

The Medora tract also carries other copper-bearing beds, among these being the Medora fissure vein, outcropping about 225' east of No. 1 shaft, but making into the shaft at depth. About 100' south of the Medora amygdaloid is another bed carrying copper in small quantities, and to the north-

ward are the Wolverine amygdaloid, of about 15' width, and the Allouez conglomerate, lying about 280' north of the Medora bed, at surface.

The Medora mine was reopened on a considerable scale to depth of 1,700' and length of 1,800', with about 2 miles of workings. Considerable work was done on an amygdaloidal bed 230' north of the Medora, which showed a little copper. All work in the mine was stopped Sept., 1909. The Medora workings are fully described Vol. VIII.

The Empire mine also carries the Medora bed, about 3 miles east of No. 1 shaft, and some trenching and test pitting, done 1906-07, on the Empire tract, showed a bed of about 15' width, carrying some copper at surface. The Empire also carries the Montreal river amygdaloid, on which the Manitou did considerable work.

The Medora-Mandan-Resolute tract of 2,440 acres carries the Kearsarge bed under practically its entire territory. The shaft on the Kearsarge bed, known as No. 2, is about a mile south of the old Medora workings, and was 1,355' deep when abandoned, 1911. The shaft is sunk at an angle of 46° with the horizon, the bed having an average dip, so far as determined, of about 43°, and a width of 18 to 20'. Diamond drilling, 1910, showed both the east and west beds of the Kearsarge formation well mineralized, the upper having an average width of about 17' and the lower or eastern bed a width of about 22', these being separated by about 70' of trap.

The Keweenaw Central Railroad Co., is a reconstruction of the old Lac La Belle & Calumet railway. The entire capital stock issue, \$730,000, is owned by the Keweenaw Copper Co. The railway company has \$500,000 bonds, not issued, and ended 1912 with accounts payable of \$167,100, presumably owing mainly to the Keweenaw Copper Co. The railway, having about 40 miles of main line, spurs and branches, cost \$856,935, and runs from Centennial, a northern suburb of Calumet, where connection is had with the Copper Range line, to Lac La Belle. Equipment includes 4 locomotives, 7 passenger cars and 82 freight cars, rock cars being of 25 tons capacity each. Railroad operations gave \$3,326 net earnings in 1907; a \$4,883 deficit in 1909, a \$4,044 deficit in 1910, a \$14,850 deficit in 1911, and a \$20,520 deficit in 1912.

The company owns a diamond drill outfit and has made extensive borings, securing a cross section of the Medora, Mandan, Resolute and Empire tracts. Considerable diamond drilling was done in 1909, the several beds paralleling the Medora being tested by diamond drilling from the bottom of the Medora shaft, beds drilled including the Allouez conglomerate to the north and the Osceola amygdaloid, Calumet conglomerate and other beds south of the Medora. The Osceola bed showed a thickness of 18 to 37' carrying a fair amount of copper, but the most promising cores were taken from the Kearsarge amygdaloidal bed, through which 5 holes were drilled. Operations, 1912-13, were confined to exploratory work in the horizon of the Ashbed lode, and the first drill hole located a copper deposit of considerable promise, early 1913, at a depth of about 500'.

KEWEENAW LAND ASSOCIATION, LTD.

MICHIGAN

Office: Room 33, No. 87 Milk St., Boston, Mass. Operating office: Marquette, Mich. T. M. Davis, chairman; Dudley S. Dean, sec.-treas.; John M. Longyear, gen. agt. Is a land corporation, holding 400,000 acres, mainly of timber lands, but with some mineral lands, partly on the Keweenaw copper belt, in the upper peninsula of Michigan, taken over from the Lake Superior Ship Canal, Railway & Iron Co.

KEWEENAW WESTERN DEVELOPMENT ASSN.

MINNESOTA

Probably idle. Letters to Summerfield Block, Cloquet, Minn., unanswered. Mine near Hinckley, Pine Co., Minn. F. V. Inskeep, pres.; H.

Berglund, vice-pres.; W. H. Lancelot, sec.; Gust Berglund, treas.; Wm. Kibbee, resident director, at last accounts. Organized Oct. 29, 1908, under laws of Arizona, capitalization \$1,000,000, shares \$1 par, nonassessable; issued, \$428,520.

Lands, 160 acres, held under contract, carrying the western extension of the Keweenaw copper-bearing bedded series, having a strike of N. 20° E. and dip of 75° with the horizon, presumably to the southward. One amygdaloidal bed, under development, traced a quarter mile, carries native copper and has an 80' shaft with a 100' crosscut.

Equipment includes a 35-h. p. steam plant with a hoist good for 500' depth, and a 5-drill Rand air compressor. There are 2 buildings.

KEYSTONE BROMIDE MINING CO.

NEW MEXICO

Idle. Office: Bloomsburg, Pa. Mine at Tres Piedras, Taos Co., N. M. J. P. Rinker, superintendent, at last accounts. Lands, 18 claims, known as the Payroll mine, in the center of the Bromide district. Property shows an impregnated zone 5 to 20' wide interbanded with sericite-chlorite schist. This fahlband is opened to depth of about 250' showing on 250' level some chalcopryite ore said to assay 4% copper with \$6 gold value. Has steam power and a 50-ton concentrator. Closed down many years and apparently moribund.

KEYSTONE COPPER MINING CO.

ARIZONA

Office: Wichita, Kans. Mine at Johnston, Cochise Co., Ariz. W. W. Miller, pres. and gen. mgr.; A. Bannow, vice-pres.; T. C. Miller, sec.; W. J. Trousdale, treas.; preceding officers, Wm. Dyck, Dr. W. G. Graybill, E. B. Pulliam and U. R. Miller, directors; Doane Merrell, territorial agt.; P. T. Bannon, supt. Organized under laws of Arizona, capitalization \$900,000, shares \$1 par. Property comprises the Bannow group of 9 claims surrounding the St. George claim and 1½ miles from the Arizona United property. Shows a large deposit of iron ore and has cut several veins in a 170' vertical shaft. The main vein has an outcrop of about 15' width with an 18" to 5' paystreak assaying up to 15% copper. A test shipment of 1 carload of high-grade copper ore was made to El Paso smelter, 1910. Was developing at last accounts.

KEYSTONE COPPER SMELTER CO.

MEXICO

Reorganized, 1911, as Keystone Mining Co. See Vol X.

KEYSTONE DEVELOPMENT CO.

ARIZONA

Operating the Isabella mine, 20 miles from Casa Grande, Pinal Co., Ariz. Reported to have 7% copper ore.

KEYSTONE EXTENSION MINING CO.

UTAH

Mine near Bingham, in West mining district, Salt Lake Co., Utah. Company inactive for some time owing to heavy flow of water in mine workings. Property covers about 3,000' of the Keystone vein outcrop and shows ore averaging \$14 per ton in gold, silver, lead and copper values, from surface down to bottom of 165' shaft.

Development by inclined shaft with drifts on vein opening up stopes from which shipments have been made. The Montana Bingham Consolidated Mining Co. will open the ground by its deep tunnel and eliminate pumping costs and heavy wagon-haul charges on ore shipped.

KEYSTONE MINE.

ARIZONA

Owned by New Keystone Copper Co., at Globe, Gila Co., Ariz.

KEYSTONE MINING CO.

IDAHO

Idle. Mine near Weiser, Washington Co., Idaho. Wm. Caldwell, sec. treas. Lands bought for \$10,000, Oct., 1908, of the bankrupt Iron Springs Mining Co. No trace of operations secured.

KEYSTONE MINING CO.

Office: Shamokin, Penn. Is a reorganization of Keystone Copper Smelter Co., of Philadelphia, and is the holding company for the Mexicana Co., Tapalpa district, Jalisco, Mexico. W. H. Childs, general manager.

Lands, about 100 hectares, in 5 groups, in Tapalpa, including the Mexicana, America and Palma groups, also timber rights to 50,000 acres of adjoining lands. Principal development is on La Mexicana group, 82 hectares, 15 miles west of Tapalpa, mine having a 200-metre crosscut tunnel, cutting 4 veins, with about 1 mile of workings. Veins are fissures in porphyry, averaging 5' width, carrying auriferous and argentiferous chalcopryrite, sphalerite and pyrite.

Equipment includes steam and electric power. There is a 30-ton mill, having 2 crushers, 2 rolls and 3 concentrating tables. A small smelter, built 1902, had a 75-ton reverberatory furnace, making matte of 30 to 48% copper tenor, when operated, but it was abandoned several years ago. It was planned to add a cyanide plant for treatment of gold ores, but apparently this was not done. Company bought the Etzatlan smelter, of 30 tons daily capacity, 1908. The entire plant was enlarged and remodeled and resumed operations in Jan., 1912.

KIMBALL MINING CO.**WYOMING**

B. A. Lathrop, supt., Arlington, Carbon Co., Wyoming. Has driven tunnels to develop a quartz vein with gold and silver-bearing copper ores. No recent returns secured.

KIN-E-CHY MINING & MILLING CO.**ARIZONA**

Formerly at Willcox, Cochise Co., Ariz. See Vol. VIII.

KING COPPER MINING CO.**UTAH**

Office: Salt Lake City, Utah. Located on the divide between Emigration and Red Butte canyon, 12 miles east of Salt Lake City, Utah. Controlled by the Baileys of Salt Lake. Property shows 6' ledge of copper carbonates on contact between quartzite and blue limestone. Is developed by 300' tunnel, principally in sandstone. Ore said to carry \$14 in gold, copper and silver.

KING DAVID MINING CO.**UTAH**

Is controlled by Knight Bros., Provo, Utah. Mine near Frisco, Beaver Co., Utah. Jesse Knight, pres.; David Evans, vice-pres. and mgr.; R. E. Allen, sec.-treas. Organized 1908, under laws of Utah, capitalization \$500,000, shares 50 cts. par, assessable. Assessment levied Feb., 1912, one-half cent per share.

Lands, 70 claims, adjoining the Horn Silver mine, including the Reciprocity group. Property is supposed to carry the extension of the Horn Silver vein. Mine has an 800' two-compartment shaft, showing values mainly in silver-lead ore, with some chalcopryrite.

Equipment includes two 80-h. p. boilers, a 12x14" double-drum hoist, and a 5-drill air compressor. Mine closed down since May, 1910.

KING EDWARD MINE.**ONTARIO**

Owned by Dobie & Co., Thessalon, Ont. Property is a prospect showing a 12' vein, known as the Canada Verde, said to be traceable 2 miles and to carry copper ore at the surface. Development by 50' shaft and numerous shallow pits. Was formerly under option to King Edward Mining Co.

KING EDWARD MINES, LTD.**BRITISH COLUMBIA**

Idle. Address: Fairview, Boundary district, B. C. Organized 1904, in British Columbia, capitalization \$500,000, shares \$1 par. Lands, 10 claims, 500 acres, in the Similkameen division of the Osoyoos district. Opened by 350' workings said to show a sulphide orebody 6 to 10' wide averaging 5% copper.

KING OF THE HILLS MINE.

- UTAH

Address: Milford, Beaver Co., Utah. Mine in Granite district, 25 miles northeast of Milford, reported to have 14 to 18' contact metamorphic vein of copper-lead ore in limestone, cut by porphyry. Development by tunnels. Equipped with concentrating mill, making a product carrying 10% copper, 42% lead and 10 oz. silver.

KING PHILIP COPPER CO.

MICHIGAN

Company was merged, 1911, with the Winona Copper Co., stockholders receiving 2 shares of Winona for each 3 shares of King Philip held. See Vol. X.

KING & QUEEN COPPER CO.

NEW MEXICO

Idle. Dr. J. Odd Hamilton, president and chief owner. Mine near Steins, Grant Co., N. M., 8 miles southwest of Steins Pass, near the King Kendall and Johnny Bull mines. Claims show limestone cut by a large N.-S. dike of monzonite porphyry with ore occurring in contact metamorphic deposit of altered garnetiferous limestone. Ore carries a little bornite, chalcopryite, pyrite, calcite and on the Queen claim, some chrysocolla. The ore is low grade, carries zinc and lead and is hard to concentrate. Development consists of numerous shallow workings over a large area.

KING & QUEEN MINING CO.

MONTANA

O. P. Weaver, pres., 1007 Bessemer Bldg., Pittsburg, Pa. Mine near Keystone, (formerly known as Carter), Chouteau Co., Mont. G. T. McCullough, vice-pres.; John F. Hinckley, sec.; H. A. Spangler, treas.; C. B. McKennon, supt. in charge. Organized Feb. 22, 1905, under laws of Montana, practically as a reconstruction of the Montana Mining & Development Co., capitalization \$1,000,000, shares \$1 par.

Property, 15 claims, partly patented, 188 acres and a 20-acre mill site, well timbered, 3½ miles from Keystone the nearest rail point, in the Spring Gulch district, 9 miles northwest from Superior. Property carries limestone, quartzite and shale with contact deposits between quartzite and limestone. The deposit under development, of 8' estimated average width, shows copper, lead and silver ore with malachite, chalcocite, chalcopryite and galena, reported to average 4.5% copper and 12 oz. silver per ton with gold values ranging up to 8 oz. per ton.

The mine has a new 1,200' crosscut tunnel opening up 4' of 4.6% copper ore that carries 9 oz. silver and 11% lead. This tunnel, planned to be driven 1,600', has cut the vein 460' below the old workings and intersects several veins. A 200' raise gives ventilation with the upper workings now abandoned. The main workings total 5,000'.

Equipment includes an 80-h. p. boiler, 25-h. p. hoist and 6-drill duplex air compressor; a 40-ton mill unit of a 100-ton concentrator has been erected and shipments of concentrate began in Sept., 1913. There are several small mine buildings and a sawmill. About 40 men are employed.

Production in 1913 was 40 to 50 tons daily, shipped to Salt Lake smelters.

KING SOLOMON MINES.

BRITISH COLUMBIA

Near Cowichan, Vancouver island, B. C. Is a development syndicate, organized 1904, capitalization \$15,000 in 10 shares. Property is on Copper mountain, in the Helmken district, 4 miles from the railroad. Owns the King Solomon and Queen of Sheba mines from which several shipments, carrying 8% copper, were made to the Tyee smelter a few years ago.

KING SOLOMON MINING CO.

MONTANA

Mine address: Clancey, Jefferson Co., Mont. S. N. Moreland, pres.; I. S. Moreland, mgr. and supt. Lands on Clancey creek, 2 miles west of

Clancey. Claims show coarse granite with some aplite cut by a dacite porphyry dike that forms the hanging wall of the lode. This lode or shear zone is 25' wide consisting of slabs of rock alternating with bands 1½ to 3" thick of solid sulphides, mainly gray copper, (tetrahedrite) galena and zinc blende with chalcedonic quartz. The ore is chiefly valuable for its silver contents and is sorted before shipment.

Development consists of a 300' inclined shaft being sunk to 700' Oct., 1913, with levels at 100', 200' and 300' west of shaft. Equipment includes a hoist, skip and air compressor. Is a small silver property, which is not considered likely to become a dividend payer.

KING SOLOMON MINING CO.

WASHINGTON

Mine near Lucerne, Chelan Co., Wash. S. J. Gray, superintendent. Developed by tunnel said to show copper ore. Equipped with gasoline power.

KING SOLOMON TUNNEL & DEVELOPMENT CO. COLORADO

Office: 810 Majestic Bldg., Denver, Colo. Mine office: Frisco, Summit Co., Colo. F. C. Dinsmore, pres. and gen. mgr.; W. H. Pingrey, vice-pres.; C. W. Rowe, sec.; O. A. King, treas.; preceding officers, S. R. Theobald, C. A. Kissinger, S. H. Alexander and Theo. Dungway, directors; H. S. Sanderson, mg. engr. Organized Jan., 1903, under laws of South Dakota, capitalization \$2,500,000, shares \$1 par, nonassessable.

Lands, 40 quartz claims and about 20 placer claims, in the Ten Mile district. Property has fissure veins in granite, carrying auriferous and argenteriferous copper and lead ores, developed by a 5,200' tunnel with 5,000' drifting. Equipment includes a 160-h. p. steam and 115-h. p. electric plant, with an 8-drill Ingersoll-Rand air compressor. Colorado & Southern railroad runs by the property.

KING WILLIAM MINING CO.

UTAH

Office: 546 East First South St., Salt Lake City, Utah. Mine address: Eureka, Juab Co., Utah. Chas. H. Blanchard, pres. and gen. mgr.; J. H. Rouse, vice-pres.; A. C. Ellis, Jr., sec.; L. H. Farnsworth, treas.; W. M. Owen, supt. Organized 1907, under laws of Nevada, capitalization \$1,250,000, shares \$1.25 par, nonassessable. Shares listed on Salt Lake Stock Exchange.

Lands, 2 claims, 16 acres, surrounded by the holdings of the Eagle & Blue Bell, Centennial-Eureka and Grand Central. Development is through the Eagle & Blue Bell workings, on the 500' and 1,000' levels, corresponding with the 1,400' and 1,900' levels of the King William. There are several shallow shafts.

Property under option to sell for 25 cts. per share to the Centennial-Eureka Mining Co., and is now being developed by drifting from the deep levels of that mine.

KINGMAN COPPER MINING & MILLING CO.

ARIZONA

Office: 211 Coronado Bldg., Denver, Colo. Mine address: Kingman, Mohave Co., Ariz. L. B. Brown, pres.; J. D. Hawkins, vice-pres.; S. W. Eckman, sec.; A. E. Humphreys, treas.; H. E. Bierce, gen. mgr.; B. W. French, chemist-assayer. Organized July, 1912, in Colorado, capitalization \$1,000,000, shares \$1 par, fully paid and nonassessable; 650,000 issued.

Property, the McNeely and other groups, including those of the Southwestern Turquoise Co. and the Aztec Turquoise Co., comprising a large part of the Mineral Park district; 58 claims, 1,085 acres, of which 34 are owned and 24 are under long-time option, all situated in the Wallapai mining district. Property is covered by granite porphyry and diabase and shows turquoise and copper silicate at the surface and is expected to show disseminated copper sulphides in depth.

Development by former owners consisted of 3 shallow shafts and a 360'

and a 290' tunnel. Company operated a No. 23 Traction Star drill rig, and after drilling 3 holes, 1 of 860', a second of 600' and a third of but a few feet, stopped this work. Company has now begun underground development at the 250' Copper Giant shaft, opening up a vein showing 7 to 9' of 8% ore, according to press reports. In Oct., 1913, company was driving along the fault plane on one of the large veins in the ridge south of Kingman. It is understood that the ore developed by churn drilling was spotty and of too low average grade to satisfy the company's engineers.

KINGSTON GOLD & COPPER MG. CO., LTD. BRITISH COLUMBIA

Company failed to make payments under its option and the property reverted to the owners, 1912. Described Vol. X.

KINGSTON MINE. ARIZONA

Owned by Capt. Wiley and Chas. Starr, Globe, Gila Co., Ariz. Group of 6 claims, 3 miles east of Globe, adjoining Superior & Boston and United Globe ground. Developed by 290' shaft with 450' of drifting on the 80' level and 100' on the 150' level. Last work in tunnel was about 50' west of shaft. The 4' vein is in quartzite and ore, said to carry oxidized copper minerals with some chalcopryrite, is shipped for converter use to Old Dominion smelter. It carries 6 to 7% copper, a few ounces silver and over 70% silica.

KINSLEY DEVELOPMENT CO. NEVADA

Office: Herald Bldg., Salt Lake City, Utah. Mine office: Currie, Elko Co., Nev. John D. Kendall, pres.; W. M. Bradley, vice-pres.; Newton A. Dunyon, sec.-treas. and mgr.; R. J. Deighton, asst. sec.; preceding officers, B. F. Beaur and Wm. Pischell, directors. Capitalization \$1,000,000, shares \$1 par. Lands, 28 miles from Currie, on Nevada Northern railroad, show limestone cut by a large number of parallel N.-S. fissures, which carry copper ore at the south end of the property and lead ore 1½ miles north. Has been worked intermittently by leasers for past 2 years. Has steam plant, 3 hoists, compressor and a concentrating mill erected 1909.

KISMET MINING CO. NEVADA

Idle. Letters to 325 Brooks Arcade, Salt Lake City, Utah, unanswered. Mine near Pioche, Lincoln Co., Nev. Wm. R. Wallace, pres.; R. E. Miller, vice-pres.; J. E. Berkeley, sec.-treas., at last accounts. Organized under laws of Utah, capitalization \$250,000, shares 25 cts. par, nonassessable; issued, \$150,000. Lands, 9 claims, in process of patenting, 8 miles northwest of Pioche, on which development work was in progress in 1911.

KITTIMAC MINES CO. COLORADO

No report from 216 Coronado Bldg., Denver, Colo. Mine address: Silverton, San Juan Co., Colo. David B. Carey, pres.; R. Thomas, sec.; F. B. Thomas, treas.; J. B. Clark, mgr. Capitalization, originally \$1,000,000, was increased, 1910, to \$1,250,000. Report filed with the state, Feb., 1910, showed indebtedness of \$227,992.46. Is a gold-silver property owning about 650 acres, unpatented, under a bond and lease, with a part interest in 1 patented placer claim. Mine said to have 12' vein, carrying gold-copper ore, and lead-copper ore of milling grade. Equipment includes steam power and a 10-stamp mill. The aerial tram line swept away by snow slides, in 1912, has been rebuilt and a cyanide plant added to the mill.

KNAPP MINING CO. COLORADO

Idle. Address: Pearl, Jackson Co., Colo. Aug. Lenke, Jr., pres., Chicago, Ill. E. H. Lenke, mgr., Pearl, Colo. Owns the Big Horn mine of 6 claims, 55 acres, carrying 5' fissure vein in gneiss and diorite. Developed by shafts of 65' and 85', showing chalcopryrite and bornite, the ore being reported to average 7% copper. Closed down since 1906. Has a 25-h. p. steam hoist.

KNIGHT COPPER CO. ARIZONA

Idle. Mine, 3 miles south of Humboldt, Yavapai Co., Ariz. Company has no local representative and left no mail address. Organized May, 1907, under laws of Arizona, capitalization \$1,500,000, shares \$1 par. Lands, 5 claims, 100 acres, showing schist and a ferruginous porphyry dike, carrying lenses of ore of 15 to 75' estimated average width, said to average about 4% copper, with high-grade paystreaks. Development is by a 25' shaft and a 175' tunnel. Presumably defunct.

KNIGHT INVESTMENT CO. UTAH

Office: Knight Bldg., Provo, Utah. Jesse Knight, pres.; Amanda M. Knight, vice-pres.; R. Eugene Allen, sec.-treas.; preceding officers, Raymond Knight, W. Lester Mangum, J. William Knight and Iona Knight, directors. This company controls 17 properties, ranging from prospects up to successful dividend-paying mines in the Tintic district of Juab county, Utah.

The company's new 100-ton custom milling plant at Silver City, designed by N. C. Christensen to treat the complex low-grade Tintic ores at an estimated treatment cost of \$3 per ton, was started in Oct., 1913. The Colorado, Iron Blossom and Black Jack mines will ensure a steady supply of ore and water has already been provided by the 20-gal.-per-minute flow from a drift on the 800' level of the Dragon Consolidated.

KNIGHT'S ISLAND-ALASKA COPPER CO. ALASKA

Nearest P. O., Valdez, Prince William sound, Alaska, but company had no local representative last year. Jas. J. Godfrey, secretary, at last accounts. Lands, 17 claims, one-half mile northeast of Northeast cove, on Dryer bay, Knights island. Property shows a shear zone of schistose greenstone 25' wide, carrying chalcopryite associated with pyrrhotite, in quartz gangue, that is developed by a 285' tunnel.

KNIGHT'S ISLAND CONSOLIDATED COPPER CO. ALASKA

Out of business. See Vol. X.

KNIGHT'S ISLAND COPPER MINING CO. ALASKA

Letters sent office and mine, Valdez, Prince William sound, Alaska, unanswered. S. A. Hemple, pres. and treas.; O. P. Brown, vice-pres.; J. C. Dieringer, sec. and mgr.; preceding officers, Chas. Kraemer, R. P. Ferguson, A. E. Grigsby and Swan Johnson, directors; Geo. Wolintine, supt., at last report. Organized under laws of Alaska, capitalization \$1,000,000, shares \$1 par.

Lands, 8 claims, 1 fractional, 150 acres, near tidewater, on Dryer bay, Knight's island, Alaska. Property carries 2 veins, 1 having a gossan carrying copper stains, developed by 3 crosscut tunnels and a 60' shaft, showing 30' of ore, from which shipments to the Tacoma smelter returned 19.35% copper. No. 1, a prospect tunnel, cuts a vein carrying chalcopryite giving assays of 8.2% copper. No. 2 is a 130' drift tunnel, on a vein of 3 to 7' width, from which some ore has been shipped to Tacoma. No. 3, the main tunnel, is to be driven 1,350' to crosscut 5 veins at 400', 500', 700', 850' and 1,350' from portal. Company continued active development in 1912.

Equipment includes a hydraulic plant, said to be 200-h. p., having 1,400' of water pipe and a water wheel actuating a 4-drill air compressor.

KNIGHT'S ISLAND MINING & DEVELOPMENT CO. ALASKA

Idle. Mine P. O.: Valdez, Prince William sound, Alaska. W. C. Rothkranz, pres. and gen. mgr., 18 E. 42d St., New York City; Jesse Miller, vice-pres. and sec.; Robert Kutschinski, supt., at last accounts. Lands, 28 claims on Louis bay, said to have 11 veins of 12' average width, carrying chalcopryite ore, averaging 12% copper, which figures are highly creditable to the inventive genius of the party making them. One vein is said to have

a 2' hanging-wall paystreak of ore, claimed to assay 25% copper, with small gold values. Equipment includes a small power plant and sawmill.

KOOTENAI COUNTY MINING CO.

IDAHO

Probably dormant. Letter unclaimed at Detroit, Mich. Mine near Priest river, Bonner Co., Idaho. Capitalization \$2,000,000, shares \$1 par. Lands are at the eastern end of Priest lake.

KOOTENAI MINING & MILLING CO., NO. 2.

IDAHO

Idle. Mine near Priest river, Bonner Co., Idaho. Lands, 7 claims, at the head of Priest lake, opened by tunnels of 30' and 40', showing ore giving good average assays in copper and silver.

KOOTENAY BONANZA MINES, LTD.

BRITISH COLUMBIA

R. S. Lennie, A. E. Rand and John A. Hendry, all of Vancouver, B. C., W. Finch Page and A. C. Burdick of Victoria, directors. Organized under laws of British Columbia, capitalization \$3,000,000, shares \$5 par. Company organized to take over the Silver King mine from the bondholders of the Hall Mining & Smelting Co., Ltd., the claims of the Kootenay Development Syndicate, Ltd., those of the Dandy & Ollie Consolidated Mines, Ltd., and of the Starlight Mines, Ltd., as well as other properties.

KORKOB MINING & DEVELOPMENT CO.

ARIZONA

Frederick Minard, cons. engr.; Wm. L. Davis, mgr.; J. E. Ketson, supt., at last accounts. Organized under laws of Arizona, 1911, capitalization \$5,000,000, shares \$10 par. Owns Keystone group of 27 claims in Old Hat (Reed) district between the Santa Catalina and Rincon mountains, 35 miles north of Tucson.

Developed by 1,400' crosscut tunnel with winze 150' deep showing ore stringers, and by 300' shaft with 1,500' of work. A lower, No. 2 tunnel, reported to show an ore shoot 70' long carrying 5½% copper and \$4 in gold and silver.

At last accounts was sinking on an ore shoot and had stopped development on disseminated orebody owing to its comparatively small size. Development to date shows somewhat spotty values of about 2% copper over an area 3,000' long and for an assumed thickness of 100'.

Property equipped with air compressor, power plant and diamond drill.

K. & R. PROPERTY.

NEVADA

Situated near Ludwig, Lyon Co., Nev., 1½ miles from Nevada-Douglas mine. Reported to have recently cut a 12 to 15' vein with high-grade cuprite in the lower tunnel. Shipping regularly, 1913.

KRUG GOLD & COPPER MINING CO.

*** WASHINGTON**

Idle. Office and mine: Chewelah, Stevens Co., Wash. Geo. A. Allen, pres.; August Krug, sec. and gen. mgr.; T. L. Montgomery, treas. Organized June 12, 1906, under laws of Washington, capitalization \$1,000,000, shares \$1 par, nonassessable. Annual meeting, last Saturday in September.

Lands, 10 claims, 2 fractional, 185 acres, known as the Hartford group, 7 miles northwest of Chewelah, show contact deposits of 2½ to 4' width, between a diabase and schist, with N.-S. strike and dip of 40°. Development is by 7 prospect shafts, of 25 to 35' depth, and a 340' tunnel, showing ore carrying chalcopryite, gray copper and galena, all argentiferous and auriferous. No recent returns secured.

KUPREANOF COPPER MINING CO.

ALASKA

Mine office: Juneau, Alaska. Organized Jan., 1910, under laws of Arizona, by Roy S. Goodrich and L. L. Gates. Capitalization \$1,000,000, shares \$1 par. J. B. Mason, superintendent. Lands, 6 patented claims, near Duncan canal, on Kupreanof island. Company was operating in 1911, driving a tunnel reported to show high-grade copper ore 300' beneath the outcrop.

KUPREANOF COPPER MINING & SMELTING CO.**ALASKA**

Idle. Mine office: Petersburg, Kupreanof island, Alaska. John T. Towers, manager, at last report. Lands, 4 claims, 78 acres, show several outcrops of ore with a main vein of about 6' width, dipping into the mountain at 30°. The ore carries chalcopryrite, associated with pyrite, with quartz and feldspar gangue, and is said to average about 4% copper and \$2 per ton in combined silver and gold values. Development is by stripping, trenching, prospecting shafts and a short tunnel.

KUSKALINA (KUSKATANA) MINE.**ALASKA**

Owned by E. F. Holden and associates. Property, the southern extension of Rarus mine, on Copper mountain, near the Bonanza mine, on Copper river, Alaska. Is developing by 2 tunnels passing through 100' of limestone to greenstone contact.

LA BELLE MINING CO.**ARIZONA**

Office and mine: Vicksburg, Yuma Co., Ariz. A. W. Hompe, pres.; E. B. Moore, vice-pres.; L. S. Judd, sec. and gen. mgr.; James Bayne, treas. Organized Aug. 3, 1909, under laws of Arizona, capitalization \$100,000, shares \$10 par; issued, \$82,600. Company is a close corporation, entire stock issue being owned by officers. Annual meeting, June 30.

Property, 11 claims, 220 acres, in the Plomosa district, is said to be covered by rhyolite cut by fissure veins running northwest and dipping steeply. The vein developed is traceable for 1½ miles, averages 6' wide and carries leached material with less than 1% copper, the sulphide zone not having been reached.

Development aggregates 814', including a 478' shaft and 4 tunnels. Equipment includes 10-h. p. hoist, 2-drill compressor, 65-h. p. gasoline engine and various mine buildings. Company plans churn drilling for 1913 and 1914. Property is 10 miles from Santa Fé railroad.

LA COBRIZA DE COBRE.**MEXICO**

Address: Rafael Elias, Cananea, Sonora, Mex. Property, 5 claims, adjoining Calumet & Sonora on southeast, shows several veins in bedded volcanic tuffs with complex, silicious lead-copper-silver ore. Developed by 200' shaft with short drifts in ore.

LA COBRIZA MINING CO.**MEXICO**

Mine and works office: Noria, Sonora, Mex. Fred C. Emery, pres. and gen. mgr.; J. W. Cook, vice-pres., Manchester, England; E. B. Sharpe, sec.-treas.; C. W. Tonkin, supt.; L. W. Young, geologist. Organized June 5, 1905, under laws of Arizona, capitalization \$250,000, shares \$1 par and is legalized in Mexico.

Lands, 142 hectares, 350 acres, in the Altar district near Puerto, 7 miles west of Noria. Property shows several contact deposits of nearly vertical dip, between limestone, quartzite and granite. The main orebody under development is reported by company as of 40' average width, traceable 1,500' on surface, carrying carbonates to depth of about 100', underlain by chalcopryrite ore averaging 6 to 8% copper, 4 to 6 oz. silver and \$1.50 gold per ton.

Mine is opened by shafts of 200' and 520', and a short tunnel, management reporting 7,500' of workings. Company reports that shaft is to be sunk to 1,000' level, as soon as sufficient labor can be secured. The president claimed 300,000 tons ore blocked out, 20,000 on dumps and 1,000 tons in bins in 1911. Property idle for past year but reported to have resumed work in Oct., 1913.

Equipment includes a 300-h. p. steam plant, with a new hoist, installed 1912, and a 12-drill air compressor. There are 20 buildings, including an engine house, shops, store, office and about 15 dwellings. The smelter has

a 100-ton Macdonald hot-blast pyritic furnace, ready to blow in, in Feb., 1912, when property was shut down by orders from London.

The company's affairs have not been harmoniously managed, and many stockholders have been desirous of a change of management ever since 1909, when the manager and secretary were indicted by the Federal authorities. These charges were nolle prossed in 1910. In 1913 the stockholders elected a new directorate but the manager and his friends had a special meeting of the company called for Sept. 3, 1913, and proposed to add 2 new directors, thus giving their side a majority of the board. J. H. Strong and others, holding 100,000 shares and supported by the vice-president, who owns a like amount, secured an injunction from the Superior Court of Santa Cruz county, Arizona, preventing Messrs. Emory, Sharpe, Tonkin and Young from holding such a "snap" meeting.

Reports from the property in Oct., 1913, indicate that a compromise has been effected and that operations are to be resumed at the property under the old management.

LA CORONADO DEVELOPMENT CO.

ARIZONA

Idle. Mine office: Florence, Pinal Co., Ariz. B. Reed, superintendent, at last accounts. Lands, 18 miles northeast of Florence, have a 265' shaft, showing at bottom an 8' vein giving assays up to 25% copper, 1 oz. silver and \$2.50 gold per ton. A tunnel shows a 3' vein giving assays up to 23% copper, 15 oz. silver and \$8.41 gold per ton. No returns secured.

LA DURA MINING CO.

MEXICO

Mine office: Torres, Hermosillo, Sonora, Mex. Hartmann & Groff, managers, at last accounts. Ores carry gold, silver, copper and lead. Has steam power and turns out silver-lead-copper concentrates, when working. Idle some years and presumably dead.

LA EXPOSICION MINING CO.

ARIZONA

Address: P. O. Box 1031, Pasadena, Cal. Mine at Courtland, Cochise Co. Ariz. Apollos Fuller, pres. and gen. mgr.; Chas. E. Putnam, sec.; J. O. McCamant and J. A. V. Pieters, directors. Organized under laws of Arizona, capitalization \$2,000,000; \$1,500,000 preferred; \$500,000 common; shares \$1 par; 1,450,000 in treasury, of which 450,000 are common. Company owns silver mines, 16 hectares, a few miles southwest of the town of Cumpas, Sonora, Mex., near the Transvaal Copper Co.'s holdings; also 8 hectares, 3 miles from Nacozari and another group of 10 hectares nearby, both of these groups showing silver-gold ore. The company also owns one-half interest in the Mexican corporation owning 30 pertenencias of copper-bearing ground at Cananea, near the Greene Consolidated Copper Co.'s tract. The Cananea property, which has 4% and 5% copper ore developed, is a shipping proposition.

The main asset of the company is a lease and bond on the holdings of the Leadville Mining Co. at Courtland. Property consists of 2 groups, 187 acres, on which this company has expended \$100,000 in operation and development in 1912-13. The principal mine is the Maid of Sunshine, which shows 50,000 tons of ore blocked out averaging \$15 per ton. Equipment includes 125-h. p. steam plant and numerous buildings. This property has been reported upon by S. M. Greenidge and is described under Leadville Mining Co. At last accounts the company had failed to make payments due and title has reverted to the Leadville Mining Co.

LA FÉ CARIDAD y ANNEXAS; COMPANIA MINERA.

MEXICO

Idle. Mine near Guachinango, Mascota, Jalisco, Mex. Adolf Marx, pres.; Andrés Goebel, treas.; R. Aguirre, sec.; Richard Guenther, gen. mgr., at last accounts. Organized under laws of Mexico, capitalization 250,000

pesos. Ore carries values in copper, silver and gold. Property closed down on account of revolution.

LA FORTUNA MINING CO.**MEXICO**

Idle. Office: 315 Colorado Bldg., Washington, D. C. Mine office: Apartado 21, Ocotlán, Oaxaca, Mex. C. E. Miller, pres.; Wm. H. Brown, first vice-pres.; E. D. Stinson, second vice-pres.; Amos Tyree, sec.; Ambrose Timberlake, treas., at last accounts. Organized 1906, under laws of South Dakota, capitalization \$250,000, shares \$10 par.

Lands, 30 hectares, known as the Treadwell group, about 3 miles from Ocotlán and one-half mile from the Oaxaca-Taviche branch of the Mexican Southern railway. Property shows a well-defined nearly vertical fissure vein of 2 to 12' width, cutting bedded andesite tuffs, greatly leached and oxidized to depth of 300'. Development is by a 400' vertical shaft, with 600' of workings, two 100' prospect shafts and 4 tunnels of 700' aggregate length. Workings show argentiferous chalcopryite, with quartz gangue, estimated by company to average 4.5% copper and 200 grams silver per metric ton. Some ore was shipped returning 14% copper and 600 grams silver per metric ton. Equipment includes a 40-h. p. boiler, hoist and a small air compressor for hammer drills.

Is a silver mine, whose copper output is a byproduct only.

LA FRANCE COPPER CO.**MONTANA**

Company bankrupt. Stephen P. Wright, trustee, Butte, Mont. Property, the Lexington mine, in Butte, was sold, 1913, to Atlantic Mines Co. for \$1,003,000. See Vol. X.

LA GRACIA GOLD & COPPER CO.**ARIZONA**

Idle. Office: Long Beach, Cal. Mine office: Dewey, Yavapai Co., Ariz. Maj. T. C. Jordan, manager. Lands, known as the Red Bluff group, 6 miles east of Dewey, held under bond and lease, show ore giving assays up to 20% copper, 15% nickel and 8% cobalt, with considerable antimony and arsenic, the ore being exceedingly refractory, requiring special treatment. No returns secured.

LA RECOMPENSA MINING CO.**MEXICO**

Mine office: Santa Maria del Oro, El Oro, Durango, Mex. P. J. Opperman, superintendent, at last accounts. Mine has auriferous and argentiferous copper and zinc ores, with steam and water power, and a 10-stamp mill. Presumably idle.

LA REGINA COPPER CO.**ARIZONA**

Abortive. No trace of operations secured.

LA REGINA MINING CO.**MEXICO**

Office: 2120 W. Tioga St., Philadelphia, Pa. Mine office: San Martín Hidalgo, Jalisco, Mex. Chester P. Ray, pres.; F. W. Schmidt, vice-pres.; A. W. Brackmeyer, sec.-treas.; M. J. Slattery, gen. mgr.; John P. Delaney, supt. Organized Nov. 1, 1909, capitalization \$1,000,000, shares \$1 par, as successor of Philadelphia Copper & Gold Mining, Milling & Smelter Co. Debentures \$200,000 authorized; issued, \$62,000.

Lands, 73 hectares, including the San Vicente, La Perla, La Fe, La Concha, Ajax and other mines. Property shows veins of 3 to 25' width, carrying auriferous and slightly argentiferous chalcopryite. The mine has 4 tunnels, at 150' intervals, and a 465' shaft. La Fe mine is said to show ore up to 30% in copper tenor. The Ajax mine shows a 12' vein, estimated to average 4% copper, 2 oz. silver and \$1.33 gold per ton. La Estrella del Norte mine has a 260' tunnel. The property as a whole has 8 shafts, of 100' average depth, with a total of about 1,000' of workings, claimed to put in sight 125,000 tons of auriferous copper ore. Work on the copper ores was suspended 1909, and development has been confined since to the gold-silver

vein, said to show at depth of 115', ore averaging 2 oz. silver and 15 grams gold per ton.

Equipment includes a steam hoist and air compressor, at the San Vicente group. The mill has a 25-ton Elspass mill, 25-ton experimental cyanide plant, Huntington mill and 3 Pachuca tanks. Idle on account of political disturbances in Mexico.

LA REINA UNION MINING & REDUCTION CO. MEXICO

Idle. Office: 602 Empire Bldg., Denver, Colo. Mine office: San Javier, Hermosillo, Sonora, Mex. J. F. Williams, manager, at last accounts. Lands include the Mimbres mine, having a fissure vein carrying lenses of complex lead-copper-sulphide ore having gold and silver values. Equipment includes steam and electric power, and an air compressor. No recent returns secured.

LA SAL COPPER-SILVER MINING CO. COLORADO

Idle. Mine office: Paradox, Montrose Co., Colo. J. Ensign Fuller, pres.; John B. Overton, sec., at last accounts. Company is apparently a reorganization of Consolidated La Sal Mining & Smelting Co., which was a reorganization of La Sal Copper Mining Co.

Property, the Cashin mine, 7 claims, patented, and 3 mill sites, 150 acres, some distance from a railway. Lands are also said to carry coal. The mine has a 1,540' tunnel, showing carbonate and sulphide ores, assaying up to 35% copper and 18 oz. silver per ton. Equipment includes steam power and a Leyner air compressor.

LA SALLE COPPER CO. MICHIGAN

Office: 12 Ashburton Place, Boston, Mass. Mine office: Calumet, Houghton Co., Mich. Quincy A. Shaw, pres.; Rodolphe L. Agassiz, vice-pres.; Geo. A. Flagg, sec.-treas.; Jas. MacNaughton, gen. mgr.; preceding officers, Col. Thos. L. Livermore, Courtney C. Douglass, Francis W. Hunnewell and T. M. Perkins, directors; Ole Hallingby, supt.; Wm. Skewes and Josiah Bartell, mining captains.

Organized Dec., 1906, under laws of Michigan, capitalization \$10,000,000, shares \$25 par; issued, 302,977 shares. Company absorbed the Caldwell Copper Co. and controlled the Tecumseh Copper Co., through ownership of practically the entire issue, giving $1\frac{1}{3}$ shares of La Salle for 1 of Tecumseh, and bought the entire property of the Tecumseh, May 11, 1910, for \$1,648,000. Is controlled, through ownership of 152,977 shares, by the Calumet & Hecla Mining Co. The Calumet & Hecla contributed \$1,000,000 cash to the company's treasury, taking pay in stock, and agreed to loan \$750,000 additional cash, as needed. Balance of assets Dec. 31, 1912, was \$240,659.65. Operations for 6 months ending June 30, 1913, show mine expenses \$27,835, mine construction \$11,655, office expenses \$2,472. Balance of assets \$202,804, a decrease of \$37,854. Annual meeting, second Wednesday in June.

Lands, 2,360 acres, also the Gregory mill site, on Torch lake, nearly opposite the Calumet & Hecla mills. The Tecumseh and Caldwell contributed 560 acres each and 540 acres were furnished by the Calumet & Hecla, St. Mary's Mineral Land Co., Sheldon & Douglass Estate, and other interests, these lands being put into the company at a novel basis of valuation, figured upon zones of 2,500' depth on the dip of the Kearsarge bed, allowance being made for decreased land values on zones carrying the underlay at increased depths. There are 4 shafts, 2 on the Tecumseh and 2 on the Caldwell tract, with room for 3 additional shafts, to give a total of 7 shafts, at intervals of about one-third mile. The property carries the strike of the Keweenaw formation for about $2\frac{1}{2}$ miles.

Property has been prospected by diamond drilling, more than 30 diamond-drill holes having been bored on the Tecumseh and Caldwell tracts, a

few years ago. Little or no drilling has been done on the western portion of the La Salle, no holes drilled in search of the Pewabic amygdaloid, and only a little drilling done east of the Kearsarge bed.

The first work at the Tecumseh mine was done on the Calumet conglomerate, many years ago, when a 1,000' shaft was sunk that found no payable ore. During the second era of activity, 1889-1902, a shaft was sunk 2,300' on the Osceola amygdaloid, but this bed being found practically barren of copper, work was abandoned Nov., 1902. It is probable that the old Osceola shaft will eventually be reopened, as the southern drifts of the No. 6 shaft of the Osceola, below the 4,000' level, near the Tecumseh boundary, are among the best in that mine.

La Salle No. 1 shaft, formerly known as No. 1 Tecumseh, sunk on the Kearsarge bed, is 6x18' in size with 3 compartments, 2,146' deep, July, 1913, and shows the Kearsarge lode to be 8 to 12' thick, but characterized by irregularly distributed values. The workings have encountered large areas of good ore, some of it with very rich patches of coarse copper that is rather showy though the average value has been, on the whole, somewhat disappointing in the mill. Equipment includes a 250-h. p. boiler and a hoist.

La Salle No. 2 shaft, formerly known as No. 2 Tecumseh, is located about 1,700' south of No. 1 and is of the same size; it was 1,770' deep July, 1913, showing a bed of workable thickness but not carrying much copper. This shaft has a wooden shaft rock house. The power plant has a 125-h. p. boiler, a hoist good for 2,500' depth, and a 15-drill air compressor. Buildings include a changing house. A branch of the Mineral Range railroad was built to the shaft in 1913.

No. 5 shaft, originally known as No. 1 Caldwell, and later as No. 1 La Salle, is 1 mile south of No. 1 shaft, and can be sunk to 9,000' depth before reaching the boundary. This shaft is 1,450' deep, showed a poorly-defined bed, with unsatisfactory copper contents, and work was discontinued Nov., 1910.

No. 6 shaft, once known as No. 2 Caldwell, and later as No. 2 La Salle, sunk at a point 1,500' southwest of No. 5, is like it in dimensions. This shaft was abandoned, June, 1909, at depth of 882', because the lode shows little or no copper; the surface equipment was removed to No. 2 shaft.

The Kearsarge bed is comparatively thin in the Tecumseh tract, ranging from 7 to 11', with an average thickness of about 9'. It is estimated that approximately 1,000,000 tons of stamp rock were blocked out in No. 1 Tecumseh, to the end of 1912, the greatest length of lateral opening being on the 12th level, where a stretch of about 1,000' of good stoping ground has been developed.

Production was begun March, 1910, at the rate of about 100 tons daily, but has been interrupted at various times and was stopped early in 1912. Production for the first 2 months in 1910, was 13,754 tons of rock, yielding mineral equivalent to 167,257 lbs. fine copper, an average of slightly better than 13.5 lbs. copper per ton of rock stamped. The ore is treated at the C. & H. mill at Lake Linden.

LA SALLE COPPER MINING & MILLING CO. NEW MEXICO

Mine office: Carrizozo, Lincoln Co., N. M. Geo. C. Hopkins, vice-president. Organized under laws of Arizona, capitalization \$1,000,000, shares \$100 par. Lands, 3 claims, 60 acres, 6 miles from Carrizozo, said to show a 12' to 15' vein of low-grade copper ore. Idle.

LA UNION MINE.

MEXICO

C. B. Bell, Douglas, Ariz., owner. Neil Trumbull, manager. Property in Cerro Tordillo section of the Ajo mountains, west of Fronteras, Sonora, Mex., shows a 3 to 20' vein traceable a mile that carries high-grade copper-

gold ore. Shipments of 200 tons were made in Sept., 1913. The property was worked in 1882-86, acquired by present owner in 1906 and recently reopened, employing 30 men.

LA VENTURA MINING & MILLING CO.

MEXICO

Mine office: Ocotlan, Oaxaca, Mex. Geo. I. Bentley, manager, at last accounts. Mine carries auriferous and argentiferous copper ore, and property has a small steam plant. Presumably idle.

LADD METALS CO.

IDAHO

Office: Canterbury Bldg., Portland, Ore. Mine and works offices: Mineral, Washington Co., Idaho, and Landore, Adams Co., Idaho. Chas. E. Ladd, pres.; Zera Snow, sec.-treas.

Lands, 2 groups, in the Seven Devils district. The first of 4 claims, at Mineral, bought of Consolidated Copper Co., shipped some ore, averaging 5% copper and up to 350 oz. silver per ton. The Landore claims yielded a little ore averaging 35% copper as shipped, and ore of much lower grade has been smelted on the ground.

The company has smelters at Mineral and Landore, the former having a small water-jacket blast furnace. The smelter at Landore, of 60 tons daily capacity, has a 50-ton combination reverberatory and water-jacket blast furnace, former burning wood and latter burning coke. This anomalous furnace was devised on a novel but unsuccessful plan, combining in a double stack, blast and reverberatory furnaces, with a downward blast and a moist updraft, charging being in both furnaces, and between the two. Fuel was furnished by a gas producer consuming wet, rotten, white fir wood. As theory and practice did not agree, the plant was remodeled along common-sense lines.

Smelters were closed down Nov., 1905, on account of poor transportation facilities that rendered it difficult to secure flux and fuel. Idle and property regarded as hopeless.

LADYSMITH COPPER MINING CO.

MONTANA

Office: 309 So. La Salle St., Chicago. Mine near Elliston, Powell Co., Mont. Edw. R. Roe, pres.; F. J. Schroter, sec.-treas.; preceding officers, W. A. Lynch, Wm. K. Steele and B. B. Switzer, directors. Organized 1905, under laws of South Dakota, capitalization \$1,600,000, increased from \$400,000 in 1908, shares \$1 par.

Lands, 10 claims, 12 miles northwest of Elliston, are well timbered and carry a contact deposit between limestone and granite that is 15' in maximum width. Development includes a 180' two-compartment shaft, and a 110' shaft, with about 1,500' of workings, sulphide ore occurring at depth of about 165'. Idle since June, 1910.

LAKE CITY MINING & SMELTING CO.

COLORADO

Mine and works office: Lake City, Hinsdale Co., Colo. B. N. Ramsey, vice-pres. and mgr.; Nelson Hopper, supt., at last accounts. Company supposedly authorized a bond issue, 1910. Mine is developed by tunnel. A 50-ton smelter, near the mine, on the outskirts of Lake City, does a small custom business. No returns secured.

LAKE COPPER CO.

MICHIGAN

Office: 85 Devonshire St., Boston, Mass. Mine office: Lake Mine, Ontonagon Co., Mich. Wm. A. Paine, pres.; John H. Rice, vice-pres.; Robt. H. Gross, sec.-treas.; preceding officers, Wm. F. Fitzgerald, Reginald C. Pryor, Galen L. Stone and Robt. T. McKeever, directors; C. K. Hitchcock, Jr., supt.; Wm. Letcher, head mining captain; Wm. Ivey, asst. mg. capt.

Organized Nov. 28, 1905, under laws of Michigan, capitalization \$2,500,000, shares \$25 par, \$3 paid, fully issued. Shares are listed on the Boston

Stock Exchange. Federal Trust Co., Boston, registrar; State Street Trust Co., Boston, transfer agent. Annual meeting, third Tuesday in June.

The company began business with \$45,000 cash, and has been financed by sale of treasury stock, rather than assessments on the customary Lake Superior plan. Sales of stock, to end of 1910, when balance of issue was sold, netted the company \$847,379, the last sale of stock having been 13,450 shares, at \$35, Nov., 1910. Balance of assets, April 30, 1913, was \$35,071.02, including cash and copper of \$14,664.99.

Lands, 2,010 acres, including 1,150 acres of mineral land, 680 acres of timber lands and 180 acres of cutover lands. The company bought 20 acres immediately east of the shaft from St. Mary's Mineral Land Co., to provide room for a surface plant, the purchase carrying with it mineral rights to a depth of 100', thus caring for the upper portion of the Lake shaft, collar of which is almost divided by the section line. Property includes the S. E. $\frac{1}{4}$ of Sec. 29, S. E. $\frac{1}{4}$ of Sec. 30, N. W. $\frac{1}{4}$ of Sec. 32, and E. $\frac{1}{2}$ of Sec. 31, T. 51 N., R. 37 W.

The first work of the company was done on the Knowlton and Butler beds, with a little work on what formerly was supposed to be the Evergreen, principal work being on the Knowlton amygdaloid, on which there were old shafts of 170' and 300', latter having been deepened to 600' by the present company. Considerable copper was taken from the Knowlton bed, but it was thought wise to transfer work to virgin territory, at the southern end of the property, and the wisdom of this move was demonstrated by the outcome. There also is a 90' shaft on the Tresidder bed, 1,000' east of the Knowlton, which was sunk 1865, and is said to have paid for sinking from the copper extracted. Considerable diamond drilling has been done, and the borings of the Adventure, on adjoining lands, indicate that the Lake should have several other promising amygdaloidal beds, in the same general horizon as the Lake bed now being opened.

The strike of the Lake amygdaloid in the immediate vicinity of the shaft, is about N. 6° E., with dip of about 35° W. It was at first thought that the Lake bed was a fissure, but that this is not the case was proven conclusively by the disclosure of parallel strata, including a conglomerate lying about 400' thereunder. The Lake bed, which is a typical Lake Superior amygdaloidal trap flow, barring its unusual strike and dip, is exceedingly wide for a copper-bearing bed, ranging from 50 to 100'. The hanging wall of trap is fairly well defined but the footwall is extremely irregular, there being no marked line of separation between copper rock and trap. The Lake bed appears to carry 3 well-defined shoots of enriched copper ground, raking northward with depth. An attempt was made to locate the northerly extension of the Lake bed by diamond drilling from surface, but without success, though 3 holes were bored and it is now known that the lode turns west and passes into South Lake ground. Thirteen diamond drill holes have been bored, aggregating 1,638'. The northernmost bottom workings of the mine show a deflection to the westward, with a strike, at the extreme north, of N. 15° W., which strongly corroborates the hypothesis of Dr. L. L. Hubbard, who correlates the Lake bed with the third bed from the top of the 4 amygdaloidal beds cut by the drill holes of the South Lake.

A second copper-bearing amygdaloidal stratum, carrying considerable fine copper and much epidote, underlies the Lake bed at a distance of approximately 175', and has been opened by crosscuts on the 5th, 6th, 7th and 8th levels. This bed has about 2,000' of drifts on the several levels opened.

The mine ended 1912 with about 28,000' of workings, a very large proportion of the drifts being in neither the footwall nor the hanging wall, giving a rather indifferent line on the actual values in the bed. The main shaft,

started in 1911, was about 1,500' deep, May, 1913. This shaft was opened by sinking and raising simultaneously, from the different levels, and is permanently equipped with a modern steel rock house, having a storage bin 40' in diameter by 51' deep.

Equipment includes a 32x72" Nordberg duplex-cylinder double-conical-drum hoist, capable of lifting 10-ton loads from depth of a mile. The engine house is 52x87', of steel frame. There are old 6-drill and 15-drill air compressors, taken from the equipment of the old Belt mine, and a new 50-drill 2-stage cross-compound air compressor, in a steel compressor house 40x80' in size. The boiler house is 52x102', of steel frame, equipped with five 250-h. p. locomotive firebox boilers. The boiler house has a 125' concrete smokestack. Mine structures include a machine shop, smithy, changing house, office and boarding house. There are 9 new dwellings and a number of old houses at the Belt location. The property is served by the main line of the Copper Range railway, which passes through the old Belt location, with a 1½-mile spur to the shaft, and a siding has been built to within 500' of the shaft by the Mineral Range railway, giving the mine the advantage of competitive railway rates. About 150 men are employed.

Production was begun March, 1912, and amounted to 1,300,562 lbs. fine copper at end of fiscal year, April 30, 1913. In this period, 83,109 tons of rock was stamped, the average yield being 15.64 lbs. fine copper per ton. The output was secured at a cost of about 19.5 cts. per pound.

The management is thoroughly experienced and capable, and the mine, though small, is the most promising of the newer mines of the Lake Superior district.

LAKE COPPER MINING CO., LTD.

NOVA SCOTIA

Idle. Office: Eastern Harbor, N. S. Mine office: Polson's Brook, Antigonishe Co., N. S. H. G. Dunbar, sec.-treas.; A. G. Baillie, gen. agt. Organized Jan., 1908, capitalization \$2,500,000, shares \$1 par. Lands, 6,400 acres, on Polson lake, having a vein claimed to be 5' thick traceable a mile and carrying auriferous and argentiferous copper ore. Mine has a 103' shaft, with 554' of workings.

LAKE GEORGE DEVELOPMENT CO.

COLORADO

Office: 22 E. Columbia St., Colorado Springs, Colo. Mine office: Lake George, Park Co., Colo. O. W. Battles, pres. and mgr.; S. C. Drollinger, vice-pres.; A. J. Kiser, sec.-treas. and purch. agt.; preceding officers, M. A. Kiser and R. H. Kiser, directors. Organized 1910, under laws of Colorado, capitalization \$600,000, shares \$1 par, divided into 30,000 preferred and 570,000 common shares, preferred shares being issued to bondholders of this amount. Bonds bear interest at 7½%.

Lands, 28 claims, 530 acres and 750 acres miscellaneous lands, partly patented, in the Lake George district, show a calcareous contact deposit between quartzite and granite. Ores contain chalcopyrite with good silver and gold values.

Development is by 3 shallow shafts, deepest 80', and a 1,100' tunnel. Presumably idle.

LAKE HURON COPPER SYNDICATE, LTD.

ONTARIO

Liquidated voluntarily, Feb., 1901.

LAKE MILLING, SMELTING & REFINING CO.

MICHIGAN

Office: 12 Ashburton Place, Boston, Mass. Operating office: Calumet, Mich. Works office: Point Mills, Houghton Co., Mich. Quincy A. Shaw, president. Organized under laws of Michigan, capitalization \$2,500,000, shares \$25 par; fully issued, \$5 paid in. Is controlled, through joint ownership of stock, by the Allouez Mining Co. and Centennial Copper Mining Co.

Lands, 406 acres, carrying more than 1¼ miles frontage on Portage

lake, adjoining the Franklin mill site. The mill was built by the Arcadian Copper Co., and was bought, 1904, by the Centennial Copper Mining Co., and later transferred to the present corporation.

The mill of 4,000 tons daily capacity is equipped with 6 Nordberg stamps and crushing rolls to treat oversize material. Power is furnished by a 600-h. p. Nordberg cross-compound engine, and water is supplied by a 15,000,000-gal. Nordberg pump. A wharf, running 675' into deep water, is equipped with a modern coal hoist and coal shed.

LAKE SHORE MINING CO.

MICHIGAN

Idle several years. Office: 909 West Kensington Road, Los Angeles, Cal. Mine near Green, Ontonagon Co., Mich. W. H. Garlick, pres. Organized under laws of Michigan, capitalization \$500,000, shares \$25 par.

Property, 821 acres, patented, on the shore of Lake Superior, is reported to carry bedded deposits, between slate walls, of 5' and 12' width, showing copper oxides and chalcocite giving average assays of 2% copper, 0.5 oz. silver and 40 to 80 cts. gold per ton. Apparently the orebody is of the secondary or Porcupine series of the Keweenawan formation, and ores may change to native copper at depth. A little prospecting has been done.

LAKE SUPERIOR & ARIZONA MG. & SMELTING CO. ARIZONA

Office: Calumet, Mich. Mine office: Superior, Pinal Co., Ariz. John D. Cuddihy, pres.; Johnson Vivian, vice-pres.; A. E. Petermann, sec.; Wm. B. Anderson, treas.; preceding officers, Wm. H. Thielman, Hon. Angus W. Kerr, Edw. Ulseth, Henry L. Baer, Frank S. Carlton, all of Calumet; W. A. Holt, Globe, Ariz., and John T. Reeder, Houghton, Mich., directors.

Organized Sept. 30, 1902, under laws of Arizona, as the Lake Superior & Arizona Mining Co., capitalization \$200,000, shares \$1 par, and reorganized, 1904, under laws of Arizona, with present title, capitalization \$2,500,000, shares \$20 par; issued, \$1,680,000, formerly assessable, but now fully paid. Annual meeting, second Tuesday in March. A. E. Petermann, transfer agent, Calumet, Mich. First National Bank, Calumet, Mich., registrar.

Property, the Gold Eagle mine, with 11 claims, 110 acres, freehold at Superior, in the Pioneer district, 3 miles south of the Silver King mine, 30 miles west of Globe and 28 miles east of Florence. Claims show thickly bedded, steeply upturned limestone, resting on quartzite, underlain by diabase. Ore occurs following slips, or brecciation along bedding planes which in general lie within 20' of the base of the limestone. In places the ore is 4' thick, and sometimes leached iron gossan is 15' thick. This brecciation is due to fracturing or bedding faulting, and does not follow exactly the same bed.

As the vein matter is a leached iron gossan with only occasional patches and segregations of oxidized ore or residual nuclei of sulphide, hope is felt that massive sulphides will be found in depth. Though a heavy flow of water is encountered, the sulphide zone has not yet been reached.

The principal working is the Carlton tunnel, which for 2,000' follows the mineralized fracturing along the bedding plane between Devonian limestone and quartzite. This tunnel is 130' vertically below the Holt tunnel, is connected with the latter by a 165' winze on the dip of the vein and is 3,000' long, showing ore assaying up to 30% copper. At the northern end of this long tunnel, there is an incline shaft sunk along the bedding plane at 26° inclination for 1,800' with short levels at various intervals.

Equipment includes a steam plant with a 175-h. p. water-tube boiler, and a 16-drill Rand 2-stage air compressor. Fuel is petroleum, and there are 5 storage tanks at the mine and 2 at Florence, each holding 2 carloads of oil.

Buildings include a power house, smithy and bunkhouse at the mine, and an office and dwelling at Florence, 28 miles distant.

The Arizona Midland R. R. Co., organized but road not yet built, would traverse 19 miles of easy rolling country and 9 miles of hills, would cost from \$300,000 to \$500,000 for construction and equipment and would connect with the Arizona Eastern (S. P. R. R.) at Florence.

Production was 99,120 lbs. copper, 1,040 oz. silver and 188 oz. gold in 1907; none since. Work was suspended 1907, resumed 1910 by the Magma Copper Co., and again suspended 1911. Property is considered promising.

In March, 1913, the Gunn Thompson interests, who as the Magma Copper Co., had an option on the property expiring 1912, are reported to have offered to spend \$100,000 in sinking the shaft and developing and further agree to add several claims to the group, all for one-half of the company's stock, provided the L. S. & A. Co. give them title to one of the claims.

LAKE SUPERIOR COPPER CO.

MICHIGAN

Idle since 1874. Mine near Rockland, Ontonagon Co., Mich. Organized July, 1853, under laws of Michigan, capitalization \$500,000, shares \$25 par. Lands were set off and company was organized by the Minnesota Mining Co. Lands, 640 acres, in Secs. 13 and 14, T. 50 N., R. 39 W., carrying the parallel cupriferous beds of the Evergreen belt. Company expended about \$40,000, raised by assessments, and made 14,821 lbs. fine copper.

LAKE SUPERIOR COSO DEVELOPMENT CO.

CALIFORNIA

Office: Hancock, Mich. Mine office: Darwin, Inyo Co., Cal. John Kiiskila, pres.; Nels Majhannu, vice-pres.; Jacob Jarvis, sec.; Peter Strolberg, treas. Organized 1907, capitalization \$50,000, shares \$25 par. Lands, 30 claims, 600 acres, extending over a distance of about 13 miles. The property carries copper, lead and zinc sulphides. Idle and moribund.

LAKE SUPERIOR DEVELOPMENT CO.

MICHIGAN

Office: care Clyde Mackenzie, sec., Houghton, Mich. Jos. Croze, pres.; Jos. W. Selden, treas. Lands, 400 acres, held under option, being the N. $\frac{1}{2}$ of Sec. 25, and S. $\frac{1}{2}$ of S. W. $\frac{1}{4}$ of Sec. 24, T. 57 N., R. 32 W. Property, about one-half mile east of the Gratiot and about one and one-half miles southwest of the Ojibway.* Lands are on the Keweenawan formation. Drill borings made 1910-11, gave much encouragement, and company hopes to resume operations.

LAKE SUPERIOR SMELTING CO.

MICHIGAN

Office: 12 Ashburton Place, Boston, Mass. Works office: Dollar Bay, Houghton Co., Mich. Jas. MacNaughton, gen. mgr.; Harry B. Conant, supt. Organized under laws of Michigan, capitalization \$1,200,000, shares \$25 par. Is controlled, through ownership of 25,000 shares, by the Tamarack Mining Co., and by the Osceola Consolidated Mining Co., which has 15,000 shares, and the Isle Royale Copper Co., which has 8,000 shares.

The smelter, closely connected with the plant of the Tamarack-Osceola Mfg. Co., has 11 reverberatory furnaces, 5 of 11x16' size each, 4 of 17x30' size, 2 larger, of 75 tons capacity each, and 3 refining furnaces. There is a mechanical ladling and casting device having a 1,100-lb. ladle, and a casting machine with molds linked into an endless belt, dumping over sprockets into cooling tanks, whence the ingots are removed mechanically by cleat elevators, which deliver the ingots to inspection and loading platforms. On the return trip of the molds, while inverted, they pass over a rosin fire, which coats them with lampblack, to prevent sticking. About 300 men are employed. The company also owns the dismantled smelting plant at Hancock, Houghton county, Mich.

LAKE SUPERIOR & SONORA DEVELOPMENT CO.

MEXICO

Office: Duluth, Minn. C. S. Carpenter, pres.; Jas. H. Moran, vice-pres.

and gen. mgr.; E. C. Alsted, sec.-treas. Organized 1909, capitalization \$500,000, shares \$10 par.

Idle since 1909, taxes on property in Mexico unpaid, and company has probably lost its interests therein. Described Vol. X.

LAKESIDE COPPER CO.

UTAH

Office: 350 Twenty-fourth St., Ogden, Utah. H. E. Baker, pres.; J. M. Russell, vice-pres.; D. C. Lawson, sec.-treas. Organized June, 1906, under laws of Utah, and reorganized Jan., 1911, capitalization \$75,000, shares 10 cts. par; issued 430,000 shares. Lands, 20 claims, unpatented, 3 miles from the Lucin cutoff. Claims have a blanket vein, of 15 to 50' thickness, traceable 300', by shallow trenches, developed by a shallow shaft and a 400' tunnel, showing copper ore, giving assays up to 40%. Presumably idle.

LANDLOCK BAY COPPER MINING CO.

ALASKA

Office: Valdez, Alaska. Mine office: Landlock, Alaska. Dr. W. A. Rystrom, president and manager. Organized 1907, capitalization \$1,000,000, shares \$1 par, issued, 750,000 shares. Lands, 7 claims, 140 acres, on a small peninsula, with tide water on both sides, have 2 tunnels, on the western side, besides a shallow shaft, showing chalcopryite ore assaying 8% copper.

LAS ADARGAS MINING CO.

MEXICO

Office: 15 John St., New York. Mine office: Jimenez, Chihuahua, Mex. E. C. Seiler, pres.; Geo. E. Crawford, sec.; W. A. Seamon, gen. mgr., at last accounts. Claims to be organized under laws of New York, capitalization \$1,000,000, shares \$10 par. Declared a dividend of 25 cts. per share, April, 1902. Property said to be held under a bond of \$300,000, on which \$15,000 was paid. Claimed to have a 300' shaft. Is regarded with much suspicion. No recent returns secured.

LAS MORAS GROUP

MEXICO

Office: 2030 Land Title Bldg., Philadelphia, Pa. L. H. Taylor, owner. Property, 8 miles southwest of Ameca, including the La Fe mine, show an orebody consisting of a breccia of altered limestone, with fragments cemented by chalcocite and chalcopryite, in a crushed and mineralized contact zone of about 300' width, traced for 2,000', ore being reported to average 2 to 2.5% copper, with small silver and gold values. Development is by a 140' shaft, and 1,500' of tunnels.

LAS VEGAS COPPER CO.

NEW MEXICO

Idle. Mine near Tecolote, San Miguel Co., N. M. F. A. Manzanares, pres.; J. M. Thompson, sec.; J. M. Allen, treas. and gen. mgr, at last accounts. Capitalization \$100,000, shares \$1 par. Property is the Tecolote mine, near Tecolote, showing auriferous and argentiferous copper ore, also a vein of chalcantithite or natural copper sulphate. Has steam and electric power, and a concentrator.

LAS VIGAS MINING CO.

MEXICO

Office: Santa Barbara, Cal. Mine office: San Sostenes, Coyame, Iturbide, Chihuahua, Mex. Geo. E. Voorhees, Jr., manager.

Lands, 74 hectares, said to show upturned Cretaceous sandstones and shales with interbedded copper lodes, occurring as impregnations and replacements in sandstone. Four veins under development are reported to average 7 to 12' width, and are said to give average returns of 7.5% copper and 3 oz. silver per ton, mainly from disseminated bornite and chalcopryite, with occasional oxidized ores and native copper. Mine has shafts of 61', 98', 125' and 212', with various levels; also 3 short tunnels. Workings estimated to develop 160,000 tons of ore. Equipment includes steam power, a hoist, an air compressor, and a 100-ton concentrator. Buildings include an

office, store and 19 dwellings. Ore was hauled, 43 miles, to Las Trancas station, by a Buffalo-Pitts traction engine. Presumably idle.

LASQUETI ISLAND MINING CO., LTD. BRITISH COLUMBIA

Office: Vancouver, B. C. Mine office: Van Anda, Texada island, B. C. R. A. Mather, pres.; A. D. Tennant, vice-pres.; John D. Mather, sec.; Geo. E. Winter, treas.; Percy Williams, mgr., at last accounts. Organized 1910, capitalization \$500,000, shares 25 cts. par.

Lands, 3 claims, 150 acres, on Lasqueti island, on the southwestern end of Texada island, on the Gulf of Georgia, 55 miles from Vancouver. Development is by a tunnel, with a 38' upraise to surface planned to be turned into a shaft, on a 20' vein known as St. Joseph, having 4 paystreaks, of 6 to 24" width, carrying ore said to average 10% copper and \$20 gold per ton. Presumably idle.

LAST CHANCE COPPER MINING CO. MONTANA

Idle. Geo. Champagne, pres.; W. H. Nichols, sec.; Dr. T. C. Wither- spoon, treas., at last accounts. Capitalization \$1,200,000, shares \$1 par.

Lands, 2 claims, patented, adjoining the Ben Hur mine, 4 miles north of Saltese, Missoula county, Mont. Mine is developed by shallow shafts and an 800' lower tunnel, the workings showing 30' vein, faulted in the tunnel, but a winze shows an 18" streak of ore said to carry about \$100 per ton in values. Company reports past shipments of about \$150,000, one car-load shipped giving returns of 13.6% copper, 394 oz. silver and \$12 gold per ton.

LAST CHANCE MINING CO. UTAH

Idle. W. P. Worthen, general manager, at last accounts. Lands, 1 patented claim, adjoining the American Copper Co., in the Big Cottonwood district, near Alta, Salt Lake county, Utah. Shaft, at depth of 70', is said to show a 6" lead of silver-lead ore.

LATAH COPPER MINING CO., LTD. IDAHO

Office and mine: Potlatch, Latah Co., Idaho. T. P. Jones, pres.; Wm. Deary, vice-pres.; H. P. Henry, sec.-treas.; C. W. Sanderson, gen. mgr. Organized under laws of Idaho, capitalization \$2,000,000, shares \$1 par, non-assessable. Annual meeting, first Tuesday in September.

Lands, 9 claims, 1 fractional, 161 acres, known as the Copper King mine, in the Hoodoo district, 40 miles east of Palouse. Mine has a 190' tunnel, showing malachite and chalcopryrite, estimated by management to average 6 to 20% copper, ore being zinckiferous, and also carrying gold values. The mine has a steam hoist. Idle since 1907.

LATOUCHE COPPER MINING CO. ALASKA

Mine office: Latouche, Latouche island, Alaska. Geo. Barrach, manager. Lands, 7 claims, about one-half mile north of the Bonanza mine of the Beatson Copper Co., at the northern end of Latouche island. The vein has been traced about 750', by trenches and pits, and is developed by a 750' tunnel, showing chalcopryrite, associated with pyrite and pyrrhotite, with drifts in ore of 4 to 12% copper tenor, having small gold and silver values. There is an 1,175' ground tram to a shipping wharf. Buildings include a bunk house, smithy and assay office.

LATOUCHE ISLAND COPPER MINING CO., LTD. ALASKA

Office: 49 Sullivan Bldg., Seattle, Wash. Mine office: Latouche, Latouche island, Alaska. Jas. A. Murphy, pres.; Tenning Carlson, vice-pres.; Winfield S. Jamison, second vice-pres.; Gordon Everett, sec.; C. E. Bogardus, treas.; preceding officers, Dudley A. Tyng and Robt. Fay, directors; W. E. Dunkle, supt. Organized under laws of Washington, capitalization \$5,000,000, shares \$5 par.

Lands, 42 claims, with approximately 4 miles of tidewater frontage, are

on the northeastern shore of Latouche island, 60 miles south of Valdez. The property has 3 practically parallel N.-S. veins, of 8 to 20' estimated average width, with dip of about 65°, somewhat faulted but proven by trenches for about 3 miles.

Development is by a shallow shaft and tunnels of 94', 103', 160' and 200', with about 1,500' of workings, claimed to have in sight approximately 200,000 tons of 5% ore, which is considered excessive. Ore carries bornite and chalcopryite, with quartz gangue, assaying up to 25% copper, with \$1 to \$3 combined gold and silver values per ton.

Equipment includes a small hydro-electric plant having a water wheel and a Class E Rand air compressor. Company was shipping 125 tons of ore daily, June, 1913.

LAURIER MINING CO.

WASHINGTON

Office: 602 Columbia Bldg., Spokane, Wash. Mine office: Laurier, Ferry Co., Wash. Dayton H. Stewart, pres. and mgr.; E. K. Erwin, sec.-treas.; W. A. Pfeifer, supt. Organized Oct. 22, 1908, under laws of Washington, capitalization \$1,000,000, increased later to \$1,500,000, shares \$1 par; issued, 1,166,350.

Lands, 6 claims in the Curlew district, 9 miles from Grand Forks, B. C., are developed by a 60' shaft and 580' tunnel, showing a 16' vein of ore said to average 7 to 11% copper, 10 to 12 oz. silver and \$1.50 to \$2 gold per ton. Developing at last accounts.

LAURIUM MINING CO.

MICHIGAN

Office: 12 Ashburton Place, Boston, Mass. Mine office: Calumet, Houghton Co., Mich. Quincy A. Shaw, pres.; Rodolphe L. Agassiz, vice-pres.; Geo. A. Flagg, sec.-treas.; Jas. MacNaughton, gen. mgr., and Francis L. Higginson, directors; Geo. G. Endicott, asst. sec.-treas. Organized under laws of Michigan, capitalization \$1,000,000, shares \$25 par, fully issued. Is controlled, through ownership of 37,550 shares, by the Calumet & Hecla Mining Co. Has paid dividends of \$4 per share, through sale of town lots in the village of Laurium. Company ended 1913 with surplus assets of \$18,465. Annual meeting, second Tuesday in June.

Lands, 575 acres with mineral rights, including 325 acres whose surface is also owned. Company originally owned 640 acres, lying next east of the Calumet & Hecla, but a triangular tract of about 65 acres, carrying both surface and mineral rights, was sold to the Calumet & Hecla, and about 250 acres of surface rights have been disposed of since as building lots, with reservation of mineral rights. The property carries about 1½ miles of the strike of the Kearsarge bed, with 280 acres of underlay, giving the Laurium a chance to develop this bed to a depth of about 4,400'.

The Laurium shaft, started Aug. 7, 1909, as a result of previous diamond-drill borings, is about 2,200' from the southwest corner of Sec. 26, and about one-half mile north of No. 1 Tecumseh shaft. The shaft was 1,444' deep at the end of 1912, with about 6,000' of workings, showing poor ground generally. The shaft has a rock house of about 600 tons daily capacity.

Equipment includes a boiler house, with a large Belpaire boiler, an engine house with a large hoist and air compressor, and a changing house.

LAURIUM-MONTANA MINING CO.

MONTANA

Office: Ely, Minn. Herman Pete, pres.; Wm. Vuoti, sec.; Oscar Kaari, gen. mgr., at last accounts. Organized 1910, capitalization \$1,000,000, paid in \$51,000. Lands, 3 claims, 80 acres, 4 miles south of Butte, are developed by a 300' tunnel. Presumably idle.

LEACLEDE CONS. GOLD & COPPER MINING CO.

OREGON

Office: 461 Broadway, Albany, N. Y. Mine near North Powder, Union

Co., Ore. W. J. Curtis, pres.; Geo. Oliver, vice-pres.; Andrew Wolf, sec.; E. E. Palmer, treas., at last accounts. Organized June 10, 1900, under laws of Oregon, capitalization \$1,500,000, shares \$1 par. Lands, 320 acres, 3 miles from a railway, in the foothills of the Blue mountains, partly in Baker county and partly in Union county, Oregon. The mine has several hundred feet of shafts, tunnels and crosscuts, showing parallel veins of 10" to 4' width, carrying auriferous and argentiferous ores assaying up to 10% copper, with iron gangue. Presumably idle.

LEAD KING MINING CO.

IDAHO

Office: Wallace, Idaho. W. H. Herrick, sec.; E. W. Conrad, gen. mgr. Capitalization \$1,000,000. Company was organized, 1911, as successor of the Marie Mining Co., Ltd., and later was reported to have absorbed the Gray Copper Mining Co., Ltd., but the deal was not consummated.

Property, 13 claims, in McFarren gulch, about 1 mile south of Osburn, carries 2 veins, one with outcrops of high-grade argentiferous galena, the other showing outcrops of argentiferous copper ore. Development is mainly by 4 tunnels, with opencuts and shallow shafts. No. 1 tunnel, of 80', shows galena; No. 2 tunnel is 265', No. 3 tunnel is 80', and No. 4 tunnel is about 550', showing silver-lead and gray copper ore, giving good assays. Equipment includes several small cabins for mine purposes. Company dormant 1913.

LEADVILLE MINING CO.

ARIZONA

Mine office: Courtland, Cochise Co., Ariz. Wm. Holmes, pres. and gen. mgr.; W. D. Monmonier, sec.; Calvin Glenn and W. A. Stilson, directors. Organized, 1905, under laws of Arizona, capitalization \$600,000, shares \$1 par. Property was bonded, 1912, to Messrs. Fuller & Neer of Douglas, for \$600,000, with a first payment of \$30,000, final payment to be made within 14 months. (See La Expositión Mining Co.)

Lands, 13 claims, 199 acres, patented, in the Turquoise district, including the Leadville and Maid of Sunshine mines. The property shows contact deposits between monzonite and limestone. Ores are mainly malachite, azurite and chrysocolla, with some chalcopyrite and pyrite showing in the Maid of Sunshine mine. Two orebodies, under development, carry an average of about 6% copper. There are 5 shafts, deepest 365', and a 60' tunnel. Equipment includes a 250-h. p. steam plant, 2 hoists and a 3-drill air compressor. Property considered good, and with sufficient ore blocked out to be put on a productive basis. A detailed report and valuation of mine was made by S. M. Greenidge, of Douglas, Ariz., 1913.

LEADVILLE MINING & SMELTING CO.

MONTANA

Office: Larned, Kans. Mine near Basin, Jefferson Co., Mont. Chas. A. Cottrell, pres.; J. F. Upson, sec.-treas. and gen. mgr.; preceding officers, F. D. Lowrey, John Lindas and J. A. McInteer, directors, at last report. Organized June, 1904, under laws of Arizona, capitalization \$1,000,000, shares \$1 par, nonassessable; issued, \$810,000.

Lands, 12 claims, unpatented, 240 acres are in the unorganized Leadville district, 15 miles from a railway. The ground is reported to have 12 fissure veins in diorite, of which the 2 under development carry galena, with a little chalcopyrite, copper being expected to increase with depth. Management estimates ore to carry small percentages of copper, 20 to 70% lead, a small amount of zinc, 10 to 100 oz. silver, and \$3 to \$21 gold per ton. Development is by a number of shallow shafts, aggregating 410' depth, and a 380' tunnel, planned to be driven 2,000', to cut 3 veins. The Commonwealth claim has two 50' shafts showing lead carbonates and a little galena.

Equipment includes a 40-h. p. steam plant, with a hoist good for 500'

depth, and there are 3 buildings. A little ore has been shipped in the past to the East Helena smelter. Presumably idle.

LEASTOCK GOLD & COPPER MINING CO.

CALIFORNIA

Office: 500 Frost Bldg., Los Angeles, Cal. Mine office: Leastock, San Bernardino Co., Cal. Andrew Glassell, pres.; L. M. Gregory, vice-pres., treas. and gen. mgr.; E. R. Stone, sec., at last accounts. Organized Oct., 1905, under laws of Arizona, capitalization \$1,000,000, shares \$1 par, non-assessable; issued, \$573,500. Annual meeting, first Monday in July, at Tucson, Ariz.

Lands, 10 claims, unpatented, in the Vanderbilt district, on the northern side of New York mountain, have contact deposits 3' wide, between granite and limestone, that show oxidized ores and occasional native copper, with copper sulphide at depth. The ore is reported by company to average 12.6% copper and 56 oz. silver per ton. Development amounts to 400' with 4 shafts, deepest 135'. Idle since 1905, from lack of funds and apparently out of business.

LEE CONSOLIDATED MINES CO.

CALIFORNIA & NEVADA

Office: 302 Grant Bldg., Los Angeles, Cal. Properties near Lee, Inyo Co., Cal., and Ely, White Pine Co., Nev. D. C. Dack, pres.; Chas. S. McKelvey, vice-pres.; W. B. Mather, sec.-treas. Organized Dec, 1907, under laws of Arizona, capitalization \$2,000,000, shares \$1 par. Company succeeded the Guggenheim-Greenwater Copper Co., a stockjobbing enterprise, and apparently is of about the same caliber.

Property consists of the Pinon group, 5 miles northwest of Ely, opened by a shallow 1-compartment shaft, and 3 groups of claims at the mouth of Willow creek, 35 miles southeast of Greenwater. Idle several years and apparently out of funds and credit.

LEIGHTON-WYOMING MINING CO.

WYOMING

Idle. Office: 417 Seventh St., Milwaukee, Wis. M. H. Yewdale, pres.; H. E. Dankoler, sec.; Spencer S. Yewdale, treas. Organized 1906, capitalization \$1,000,000, shares \$1 par; issued, \$810,000.

Lands, 2 claims, about 1 mile north of the Ferris-Haggerty mine in the Battle Lake district. Development is by a 186' tunnel and a 65' shaft. Equipment includes a saw mill and a small machinery plant, bought 1909, from the Haskins mine.

LELAN GOLD & COPPER CO.

ARIZONA

Presumably idle. Office: Prescott, Ariz. Mine near McCabe, Yavapai Co., Ariz. Elmer W. Wells, manager, at last accounts. Property has a 500' shaft, electric power and a 10-stamp mill.

LENAPE GOLD & COPPER MINING CO.

NEVADA

Office: Dover, Del. Mine office: Searchlight, Lincoln Co., Nev. Hon. J. Frank Allee, president. Mine, known as the Goodenough, lying between the Homestead and Cyrus Noble properties, near Searchlight, has a 450' shaft, showing auriferous chrysocolla. Presumably idle.

LENAWEE MINING, M., TUNNEL & TRANS. CO.

COLORADO

Idle. Mine office: Dillon, Summit Co., Colo. Jas. H. Meyers, superintendent, at last accounts. Mine has auriferous and argentiferous copper ores. Equipment includes a steam plant and 20-stamp mill.

LENOX MINING CO.

UTAH

Idle several years. E. McCarrick, pres.; A. H. Page, sec.-treas., at last accounts. Organized 1900, under laws of Utah, capitalization \$400,000, shares \$1 par, assessable; fully issued. Lands, 9 claims, patented, 12 miles from a railroad, show ores with auriferous and argentiferous lead and copper sulphides, slightly developed by tunnel.

LENTZ GOLD-COPPER MINING & REDUCTION CO. MONTANA

Office: 964 Penn Ave., Pittsburgh, Pa. Mine office: Sheridan, Madison Co., Mont. C. E. Lentz, pres. and gen. mgr.; F. J. Mangus, vice-pres.; R. P. McChesney, sec.-treas.; S. E. Brimm, supt., at last accounts. Organized under laws of Arizona, capitalization \$3,000,000, shares \$2 par. Annual meeting, third Friday in February.

Property, 11 claims, 220 acres, and a 20-acre mill site, in the Tidal Wave district, 7 miles from the Northern Pacific railway. Lands show granite-porphry, gneiss and quartzite, said to carry fissure veins in porphyry and contact deposits between limestone, gneiss and granite, of which 3, partly developed, are claimed by the company to have average widths of 16 to 30', with strong gossans, and all varieties of copper ore, of estimated average values of 2% copper, 12 to 50% lead, 12 to 1,400 oz. silver and \$8 to \$600 gold per ton.

Development includes shafts of 30', 130', 60' and 110', and tunnels of 80', 100', 120' and 1,600', with a total of 4,800' of workings. Management estimates 8,000 tons of high-grade ore and 160,000 tons of low-grade ore blocked out.

The Northern Star mine of the company has been in litigation. Property has been idle some years, and company is apparently moribund.

LEO XIII MINING CO. NEW MEXICO

Office: Hanover, Grant Co., N. M. Property near Hanover, has recently encountered a vein of \$12 copper ore in its new development work.

LEON MINING CO. MEXICO

Office: care E. D. Morgan, pres., 100 Broadway, New York, N. Y. Mine office: Minas de San Pedro, Galeana, Chihuahua, Mex. Geo. A. Laird, mgr.; Pedro Catlin, mine supt., at last accounts. Mine carries auriferous and argentiferous lead and copper ores in large replacement orebodies in marbleized limestone, usually near porphyry dikes. Equipment includes a large steam plant, air compressor, concentrator, etc.

LEONARD COPPER CO. ARIZONA

Mine office: Gleeson, Cochise Co., Ariz. J. W. Benny, Clifton, Ariz., mgr.; J. E. Penberthy, supt., Gleeson. Organized 1910, by interests closely connected with the Shannon Copper Co., and property is under lease to that company.

Property, the Copper Belle mine, 8 claims, in the Turquoise or Courtland district. Mine has a vertical shaft and about 1 mile of underground workings on the 100', 200', 300' and 400' levels, developing several orebodies on 3 different contacts. Ore is nearly solid pyrite, occasionally with considerable chalcopryite and some bornite and averages 2% copper. It is valuable chiefly for the iron it contains, which makes good fluxing material for the Shannon ores.

Equipment includes steam plant with 2 hoists, compressor, repair shop, etc. Output 150 tons per day, loaded directly into railway cars at mine and shipped over the E. P. & S. W. railroad to Morenci.

LEONARD MINE. MONTANA

Owned by Anaconda Copper Mining Co., at Butte, Silver Bow Co., Mont.

LEONORA y HUERTA; MINAS. MEXICO

Office: care James M. Daniel, owner and gen. mgr., Apartado 16, Aguascalientes, Mex. Mine near Villanueva, Zacatecas, Mex. Jas. M. Daniel, Jr., supt. and engr.; Manuel Varila, mine supt., at last accounts.

Property, 100 acres, with 500 acres miscellaneous lands, in the Jalapa district, showing a fissure vein in porphyry, of 10' average width, carrying galena, argentite, melaconite and azurite, with clay gangue, said to give

average returns of about 5% copper, 10% lead, 200 oz. silver and 29 milligrams gold per ton. Mine is an old one, opened in 1820, and reopened 1883, has shafts of 300' and 1,000', with about 1 mile of underground workings. Equipment includes steam power, and a concentrator having 1 crusher and 12 planillas, for treating low-grade ores. Concentrates and smelting ores are shipped, 75 miles, by pack train, to the Aguascalientes smelter, when the mine is operated. Presumably idle.

LEONORA MINING & MILLING CO.

UTAH

Office: 37 Commercial Block, Salt Lake City, Utah. Mine office: Milford, Beaver Co., Utah. John Matson, pres.; Willard Hansen, vice-pres.; C. D. Brown, sec.-treas.; preceding officers, J. W. Chase and W. P. Kinley, directors; N. C. Christensen, mine supt. Organized Dec. 19, 1903, capitalization \$100,000, shares 10 cts. par, assessable; issued, \$40,000.

Lands, 13 claims, in the North Star district, near Milford, have fissures in limestone carrying replacement deposits of gold, silver and lead ores. Mine is developed by tunnels of 400', 100' and 35', and by 7 shallow shafts of 25 to 100' depth. Developing at last accounts.

LEPANTO MINING CO., INC.

PHILIPPINES

Office: Manila, Philippine islands. Mine office: Mancayan, Lepanto, Luzon, Philippines. Geo. E. Wolf, pres.; J. R. McDill, vice-pres.; M. F. Loewenstein, sec.; J. A. Hamilton, treas.; Albert P. Wright, supt. Organized Sept., 1906, under laws of the Philippines, capitalization 1,000,000 pesos, shares 100 pesos par. Company holds a franchise for a railway, from Mancayan to Bangar, on the western coast of Luzon. The copper property, but slightly developed, in the vicinity of Mancayan, was optioned to the Tellus Aktiengesellschaft, of Frankfurt-am-Main, Germany, but the option was surrendered, 1910. Presumably idle.

LE ROI MINING CO., LTD.

BRITISH COLUMBIA

Liquidated. Property sold, 1911, to Consolidated Mining & Smelting Co. of Canada. See Vol. X.

LE ROI NO. 2, LTD.

BRITISH COLUMBIA

Secretary's address: F. A. Labouchere, 541 Salisbury House, London Wall, London, E. C., England. Mine office: Rossland, Trail district, B. C. Employs about 110 men. Lord Ernest W. Hamilton, chairman; preceding officer, A. B. Dealtry, F. C. D. Haggard and H. W. Morrison, directors; Ernest Levy, mine mgr.; Alex. Hill & Stewart, cons. engrs.

Organized June 1, 1900, under laws of Great Britain, capitalization £600,000, shares £5 par; fully issued and fully paid. Has paid dividends as follows: 5s. in 1901; 5s. in 1902; 3s. in 1904; 4s. in 1905; 6s. in 1906; 2s. in 1907; 6s. in 1908; 6s. in 1909; 6s. in 1910; 6s. in 1911. Total dividends to end of 1911 were £2 9s. per share, or £300,000. For fiscal year ending Sept. 30, 1912, net profit was £3,043, after writing off £21,895 for depreciation. The company holds a share interest in the Cloncurry Syndicate, Ltd., and a two-thirds interest in the Van Roi Mining Co.

Lands, 120 acres, including the Josie No. 1 and Annie mines, on Red mountain, also 8 claims near the old mine, 2 claims near the Velvet mine, and 5 claims in the Ymir district of British Columbia. Considerable diamond drilling has been done each year since 1906, the total annual borings running considerably over 10,000' in the aggregate. New underground openings made were 3,286' in 1907, 4,362' in 1910 and 5,845' in 1912.

The property shows a number of veins, the most important being the Josie, Annie and Hamilton. Development is by the 1,300' Josie main shaft, and by 3 tunnels, 2 on the Josie and 1 on the Poorman claim. The Josie vein is narrower than the average in the camp but has ore about twice as rich as the average, the bottom workings showing ore carrying up to 4%

copper and 15 dwts. gold per long ton. Ore of the property as a whole is chalcoppyrite, associated with pyrite and pyrrhotite, in a silicious gangue, with average assay of 1.64% copper, 0.87 oz. silver and 0.8 oz. gold per ton. Concentrating ore ranges 0.4 to 0.5% in copper tenor, with only about 20% of the copper saved, the extraction of assay values in gold being 56 to 60%. Ores carry values in gold, copper and silver in the order named, and output is divided into smelting and concentrating ores. Ore reserves were estimated by the management, 1913, at 150,000 long tons, including some ore shoots of considerably better than the average grade of the camp. Side line agreements with the Consolidated Mining & Smelting Co. of Canada insure freedom from possible litigation.

Equipment at the Josie shaft includes a 150-h. p. electric hoist, good for a quarter-mile depth. Buildings include a machine shop, framing shop, smithy, superintendent's dwelling, etc.

The mill, across a small gulch from the Josie shaft, is of 50 tons rated daily capacity, having Blake and Gates crushers, 2 Chilean mills, 3 Jencke sizers, and 6 Wilfley tables. An Elmore oil concentrator, fully described Vol. IV., was installed 1903, proving a technical but not a commercial success, and was superseded by Wilfley tables. Concentrates average 1.8% copper, 1 oz. silver and 1.3 oz. gold per ton.

Largest copper production was 3,001,027 lbs. in 1902. Recent production has been as follows: 803,409 lbs. fine copper, 22,054 oz. silver and 19,615 oz. gold in 1906; 539,048 lbs. copper, 13,393 oz. silver and 12,602 oz. gold in 1907; 910,354 lbs. copper, 20,488 oz. silver and 28,452 oz. gold in 1908; 957,800 lbs. copper, 22,401 oz. silver and 28,352 oz. gold in 1909; 970,966 lbs. copper, 24,078 oz. silver and 26,447 oz. gold in 1910; 864,500 lbs. copper, 19,219 oz. silver and 22,725 oz. gold in 1911; 507,499 lbs. copper, 12,281 oz. silver and 14,157 oz. gold in 1912. Property considered valuable and management good.

LE ROY MINING CO.

MEXICO

Idle. Mine near Pilaes de Moctezuma, Sonora, Mex., has gold, silver and copper ores, slightly developed.

LEROY GOLD & COPPER MINING CO.

MONTANA

Office: Wallace, Idaho. Mine office: Saltese, Missoula Co., Mont. Hon. Herman J. Rossi, pres.; C. E. Clark, sec.-treas., at last accounts. Lands adjoin the Monitor mine, and survey for the extension of the Monitor tunnel runs through this property. Idle several years, except for annual assessment work.

LESLIE COPPER MINING CO.

IDAHO

Office: 508 Bank St., Wallace, Idaho. Mine office: Mullan, Shoshone Co., Idaho. Wesley Everett, pres. and mgr.; A. W. McLaughlin, vice-pres.; Hon. Herman J. Rossi, sec.-treas.; preceding officers, A. M. Stevens and O. E. Peppard, directors. Organized Feb., 1899, under laws of Idaho, capitalization \$100,000, shares 10 cts. par.

Lands, 11 claims, 220 acres, adjoining the Amazon-Dixie, also a mill site and 2 water rights, lying east of Mullan. Property has several fissure veins, in porphyry, the main vein, of 12' average surface width, having a 35' shaft, with development mainly by tunnels, giving about a mile of underground openings. The upper workings show galena and copper ore, and a lower tunnel is to give a back of 650'. The property carries mainly silver-lead ore, of concentrating grade, with a narrow copper paystreak. Equipment includes water power, an air compressor, and several mine buildings.

L'ETETE GOLD & COPPER

MINING CO.

NEW BRUNSWICK & NOVA SCOTIA

Mine office: L'Etete, Charlotte Co., N. B. Property includes the old

Johnson mine, opened 1860, and reopened 1902, having 2 short tunnels and a 145' main shaft, showing ore of good assay value. Has a steam plant and shipping facilities at tide water. Company also owns mineral lands in Nova Scotia. Idle some years and apparently past resuscitation.

LEUPFER MINING CO. MONTANA

Mine address: Whitefish, Flathead Co., Mont. George Hoffman, superintendent. Property about 8 miles west of Whitefish, is developed by a 150' shaft, showing a well-defined vein of copper ore in porphyry and limestone. Has a small steam hoist.

LEVIATHAN GOLD MINING CO. MONTANA

Mine office: Pony, Madison Co., Mont. Chas. E. Morris, general manager, at last accounts. Property carries copper ores, with values mainly in gold. Equipment includes a hydro-electric power plant, air compressor, and a 100-ton concentrator. Presumably idle.

LEWIS & CLARK MINING CO. IDAHO

Office and mine: Mullan, Shoshone Co., Idaho. J.-Wm. Grismer, pres.; Thos. G. Kennedy, sec. Organized 1907, under laws of Idaho, capitalization \$1,250,000, shares \$1 par. Lands, 12 claims, northeast of the Snowstorm, showing a strong vein having a gossan. Property has little or no development.

LEWIS GROUP. NEVADA

Mine office: Contact, Elko Co., Nev. Martin Hickey and associates, owners. Property shows replacement and contact deposits in limestone. Mine reported on by Harry Allen and Raymond Guyer of Hailey, Idaho, in 1913.

LEWIS MINES. COLORADO

Office: Telluride, San Miguel Co., Colo. Property has fissure veins with shoots of complex lead-zinc-copper ore, treated in 50-ton concentrating mill. Has steam plant.

LEWISOHN EXPLORATION & MINING CO. NEW YORK

Office: 334-11 Broadway, New York. Frederick Lewisohn, pres.; E. C. Westervelt, sec.; Walter Lewisohn, treas.; preceding officers, Albert Lewisohn, P. S. Henry, O. B. Van Sant and Kenneth K. McLaren, directors. Organized Jan. 6, 1906, under laws of New Jersey, capitalization \$5,000, and was said to plan increasing its capitalization to \$15,000,000, by easy stages, as properties were acquired. Is controlled by Lewisohn Bros. Inactive.

LEXINGTON MINE. MONTANA

Owned by Atlantic Mines Co., at Butte, Silver Bow Co., Mont.

LIBERTY COPPER MINING CO. WASHINGTON

Office: Spokane, Wash. Mine office: Bluecreek, Wash. J. H. Reser, pres.; C. Oldfather, vice-pres.; A. Haas, sec.; S. G. Neff, treas. and gen. mgr.; R. E. McVicar, trustee. Organized under laws of Washington, capitalization \$1,000,000, shares \$1 par. Property, 6 claims, well watered and timbered, on Blue creek, about 1½ miles from Blue Creek station, and 6 miles northwest of Chewelah. The property had 3 orebodies, 2 being blind veins. The main vein, developed by 2 tunnels, lower 502' long at last accounts, is of about 7' average width, carrying auriferous and argentiferous copper and lead ores.

Equipment includes a Fairbanks-Morse steam hoist, 100-h. p. boiler and an air compressor. The mine has been under steady development since 1906, and made its first carload shipment March, 1909, to the Northport smelter. Management is said to plan a concentrator.

LILY GROUP MINING CO. BRITISH COLUMBIA

Mine office: Jedway, Queen Charlotte island, B. C. Property, on

Moresby island, of the Queen Charlotte group, is in the vicinity of the Awaya-Ikeda mine. No trace of operations securable and probably dead.

LILY MINING CO.

UTAH

Mine office: Eureka, Juab Co., Utah. Lands, 3 claims. Is controlled, through a two-thirds stock ownership, secured 1908, by the Eureka-Lily Mining Co., and to all practical intents and purposes is out of business, and a part of the Eureka-Lily.

LIME MOUNTAIN COPPER CO.

ARIZONA

Idle. Mine office: Johnson, Cochise Co., Ariz. Organized 1906, under laws of Arizona, capitalization \$1,000,000, by Davis S. McGahan and I. N. Kattensbroth. Property consists of the George Washington group of 21 mining claims located near the Empire mine, in the Dragoon mountains. The claims are slightly developed by tunnels showing small amounts of copper ore.

LINCOLN CONSOLIDATED MINING CO.

ARIZONA

Idle several years. Office: Wilmette, Ill. Mine office: Tucson, Pima Co., Ariz. Chas. A. Wightman, pres.; Geo. E. Fernald, sec.-treas., at last accounts. Organized June, 1904, under laws of Arizona, capitalization \$2,000,000, shares \$1 par.

Property, the Garcia group of 31 claims and 4 other claims, 21 patented, in the Papago district, 12 miles from the Twin Buttes railway. Property shows limestone, granite-porphry and diorite, carrying replacement ore-bodies ranging from 4 to 25' in width, and opened by a 400' tunnel and several shafts, of 50 to 200' depth. Ores are of low average value though selected high-grade copper ore has been shipped.

Equipment includes two 15-h. p. gasoline hoists, good for 400' depth, and a 15-drill Rand air compressor. There are 5 buildings, including machine shop, smithy, store and 2 dwellings.

LINCOLN GOLD & COPPER MINING CO.

GEORGIA

Idle. Mine office: Metasville, Wilkes Co., Ga. Carl Heinrich, pres. and gen. mgr.; W. Murdock Wiley, sec. Organized June 11, 1906, under laws of Oklahoma, capitalization \$2,000,000, shares \$1 par; issued \$1,820,000. Paid 1 dividend, of one-half of 1%. Was practically the successor of the Seminole Mining Co., which was a sad failure. Annual meeting, first Tuesday in August.

Lands, 901 acres, freehold, known as the Magruder or Seminole mine, just over the Wilkes county line, 12 miles from the Georgia Central railroad, and 70 miles from Ducktown, Tenn. Property shows gray sericitic schists, intruded by eruptive dikes of 2 different ages, with 4 veins in schist and between schists and eruptive rocks. They have an average strike of N. 30° E. to N. 40° E. and dip of 50° to vertical, veins averaging 3 to 14' in width, and traceable 1,200', showing ores consisting of pyrite with chalcopyrite, some bornite, cuprite and melaconite, estimated by company to average 2.5% copper, 3% lead, 1.5% zinc, 4 to 5 oz. silver and \$5 gold per ton.

The mine, opened 1852, and closed 1862, on account of the American Civil War, was reopened 1878, 1899 and 1905. Development is by a 225' main shaft, a 150' air shaft and shafts of 40', 45' and 80', with about 1,500' of workings.

Equipment includes a 175-h. p. boiler, 12-h. p. and 15-h. p. hoists and a 4-drill Rand air compressor. There are 10 buildings, including a machine shop, smithy, assay office and boarding house.

The small and ramshackle mill is 30x70' in size, of wood, on stone foundations, and equipped with a Gates centrifugal crusher, set of rolls, Twentieth Century jig, 2 Bartlett tables, elevators and revolving screens.

The toy smelter, immediately adjoining the concentrator and very

close to the mine, has a 16-ton rectangular water-jacket blast furnace, and a 10-ton reverberatory furnace, making, when in operation, a matte of 15 to 20% copper tenor, carrying 20 oz. silver and 1.5 to 3 oz. gold per ton, shipped to the Maurer works of the American Smelting & Refining Co. for reduction, first-class ore and concentrates also being shipped to Maurer.

LINCOLN GOLD MINING & MILLING CO.

ARIZONA

Formerly at Humboldt, Ariz. Succeeded, 1911, by Knickerbocker Mining Co. See Vol. X.

LINCOLN ISSUES CO.

ARIZONA

Mine office: Superior, Pinal Co., Ariz. W. C. Browning, gen. mgr.; Thomas Tighe, supt.; John J. Neary, purch. agt.

Property is the old Reymert mine, 7 claims, patented, 10 miles southwest of Superior, that has been idle since 1889. The mine has a large tonnage of low-grade ore, principally lead-silver, with indications of copper on the surface. The ore occurs in veins 10 to 60' wide, traceable for long distances and characterized by calcite stained by manganese. The new owners will install a 60-h. p. steam plant, hoist and No. 7 pump and is actively sinking a new shaft, 175' deep Oct., 1913, planned to go below water level, as old workings stopped at that horizon. Property regarded as promising and management first class.

LINCOLN-NEVADA MINING & MILLING CO.

NEVADA

Idle. C. A. Bond, pres.; A. H. McCullough, sec.; Dr. Frank Winders, treas., at last accounts. Organized July, 1906, capitalization \$1,000,000, shares \$1 par, nonassessable. Lands, 10 claims, 8 patented, shortly southeast of Pioche. The mine has about 800' of workings showing copper and lead ores. Equipment includes a hoist, with a 10-stamp mill and several buildings.

LINGANORE COPPER CO.

MARYLAND

Office: Frederick, Md. Mine office: New London, Frederick Co., Md. J. H. Gambrell, Jr., pres.; Thos. A. Dunshee, gen. mgr.; Dr. J. O. Hendrix, sec.; Oscar B. Coblenz, treas., at last accounts. Organized March, 1907, under laws of Arizona, capitalization \$1,000,000, shares \$1 par, nonassessable; issued, \$474,000. Annual meeting, third Thursday in January.

Lands, 306 acres, including the Linganore, or New London mine, and the Dolly Hyde mine, latter including a good farm, at Libertytown, near Monrovia.

The new London, or Linganore mine, 86 acres, with 14 acres of timber land, formerly held under a 25-year lease from Capt. Edw. S. Wertz, was bought by the company, in 1910. This mine was opened and worked, 1835-55, apparently at a profit, but was idle after 1881, except for unwatering and retimbering the shaft, 1893-1904, until reopened by the present company in May, 1907.

The property has two 4 to 5' fissure veins in slate and marble, with northeast strike, carrying bornite and gray copper. The ore is estimated by management to average 3% copper and 16 oz. silver per ton, with a trace of gold. Development is by a 300' shaft, planned to be deepened to 500' and 4 tunnels, longest 340', with a total of 1,095' of workings, estimated by the management to block out 17,307 tons of ore for stoping.

The Dolly Hyde mine, 220 acres, was for many years the principal copper producer of Maryland and though never having a large output, shipped, without selection, considerable 6 to 12% ore to the Baltimore smelter. The mine has metamorphic deposits in dolomite and phyllite, carrying a little malachite in the upper workings, succeeded, at shallow depth, by bornite and chalcopyrite.

The New London mine has a 65-h. p. steam plant, with a 35-h. p. hoist,

good for 500' depth, and an 8-drill Sullivan air compressor. The property has 12 buildings, including a 24x36' machine shop, 20x24' smithy, 20x28' carpenter shop, office, engine house, sawmill and 6 dwellings.

The mill is 44x54' with a 26x76 concentrating room, equipped with a 125-h. p. steam plant, 15x30" Cresson crusher, of 100 tons daily capacity, 4 sets of rolls, 1 Richards jig, 5 James tables, 5 trommels, screens, settling tanks, etc. Property considered good though small and management good.

LIPPINCOTT MINE.

MONTANA

Mine address: Essex, Flathead Co., Mont. John Stewart, operator. Lands, 4 claims, developed by a number of tunnels, longest 200' and 300', show copper ore of commercial tenor.

LITTLE BELL CONSOLIDATED MINING CO.

UTAH

Office: 161 South Main St., Salt Lake City, Utah. Mine office: Park City, Summit Co., Utah. Solon Spiro, pres. and gen. mgr.; J. B. Bean, sec., at last accounts. Organized 1902, under laws of Wyoming, capitalization \$1,500,000, shares \$5 par, nonassessable; fully issued. Began payment of 5-ct. quarterly dividends, Nov., 1909, and, up to and including Sept. 2, 1910, had paid 4 quarterly dividends of \$15,000 each. Shares are listed on the Salt Lake Stock Exchange.

Lands, 30 claims, patented. Mine, having considerable development, carries argentiferous lead and copper ores, and has been opening new ground steadily since work was resumed, 1909.

Equipment includes steam power, with a hoist and an air compressor, and electric power is taken from the Knight plant at Provo. The old 100-ton mill of the Fortuna Mining Co., at Bingham Canyon, was bought 1910, and re-erected at Park City.

LITTLE BILLY OPERATING CO.

BRITISH COLUMBIA

Mine office: Van Anda, Texada island, B. C. J. C. Taylor, superintendent. Property is the Little Billy mine, having an orebody of 8' estimated average width, developed by a 200' shaft, with a 35' headgear. Equipment includes an 80-h. p. boiler, single-drum hoist, and a 5-drill air compressor. There is a crude concentrating mill, with sorting tables, and a 500' trestle with double-track gravity tram to a shipping bunker on tidewater.

LITTLE BULLY HILL MINING & SMELTING CO.

CALIFORNIA

Idle. Mine near Winthrop, Shasta Co., Cal. Capitalization \$1,000,000, shares \$1 par. Lands, 5 claims, said to adjoin the Bully Hill mine, and to be opened by a 130' tunnel and several trenches, that show sulphide ore. Company's prospectus misleading and its operations apparently unsuccessful.

LITTLE CHOPACA MINING CO.

WASHINGTON

Office: Wooster, Ohio. Mine near Loomis, Okanogan Co., Wash. C. A. Andrus, pres.; A. B. Lee, sec.-treas., at last accounts. Organized under laws of Washington, as successor of Six Eagles Mining Co. Lands, 11 claims, carrying auriferous and argentiferous lead and copper ores. Idle some years, except for necessary annual assessment work.

LITTLE JOHNNIE MINE.

ARIZONA

In the Hassayampa district, Yavapai Co., Ariz. Property shows fissure vein carrying gold-bearing copper ore said to run \$100 per ton.

LITTLE LIGHTNING COPPER CO.

TEXAS

Mine office: Sierra Blanca, El Paso Co., Tex. English & Cahil, owners. John Gilcrease, manager, at last accounts. Lands in the Quitman mountains, about 3 miles from Lasca station, on the Southern Pacific railway. The mine has replacement orebodies in limestone, which resemble those of the Jarilla district, New Mexico. The workings have developed copper sul-

phides and small shipments were made throughout 1910 to the El Paso smelter. Presumably idle, 1913.

LITTLE MARY MINING CO. ARIZONA

Idle. Office: Douglas, Ariz. Mine office: Pearce, Cochise Co., Ariz. J. W. Yost, pres.; E. E. Williams, vice-pres.; E. T. Phillips, sec.; J. A. Thompson, treas., at last report. Lands, 12 claims, near Thumb Butte, about one-half mile east of Pearce, and 2 miles from the Southern Pacific railway. Development is by a shaft, on the Copper Mill claim, showing ore said to assay up to 23% copper, from 10 to several thousand ounces silver, and \$4 gold per ton.

LITTLE MIAMI COPPER MINES CO. ARIZONA

Office: 15 Broad St., New York. Jas. A. Fleming, pres.; C. A. Miller, sec.-treas., at last accounts. Organized Jan., 1910, under laws of Arizona, capitalization \$1,000,000, shares \$1 par, nonassessable; issued, \$617,000.

Lands, the Wild Air group of 3 claims, 60 acres, owned outright, in the Miami district, bought for 600,000 shares of stock, escrowed for 1 year with the Empire Trust Co., New York.

The mine has a 210' two-compartment shaft, several hundred feet north of the Red Springs shaft of the Miami, started in Gila conglomerate, intending to crosscut at depth to the schist contact, but at about 150' depth the shaft cut the schist, showing some chrysocolla. The shaft has a 25-h. p. gasoline hoist. Idle and presumably out of funds. See Vol. X for further details.

LITTLE MINA MINE. MONTANA

Owned by Anaconda Copper Mining Co., at Butte, Silver Bow, Mont. **LITTLE NORTH FORK COPPER M. & M. CO., LTD. IDAHO**

Office and mine: Wardner, Shoshone Co., Idaho. T. R. Mason, pres.; Archie McDonald, sec.; John Locke, treas.; Jas. H. Hoskins, supt. Organized Sept., 1903, under laws of Idaho, capitalization \$1,500,000, shares \$1 par, assessable.

Property, 10 claims, known as the Handspike mine, on Little Copper creek in the North Fork district, 12 miles from a railroad. Claims lie above the Horst-Powell holdings.

Development is by the 232' No. 1 upper tunnel, showing ore assaying up to 28.8% copper, 1 oz. silver and \$1.20 gold per ton, and the No. 2 lower tunnel of 1,500' showing a 12 to 18" paystreak of argentiferous copper ore that averages \$8 to \$30 per ton. Selected samples give assays up to 44% copper and 34 oz. silver per ton. Property has not yet developed ore in commercial quantities, but company has spent \$15,000 in development and will continue 4 men at work sinking and drifting during winter of 1913-14.

LIVERPOOL MINING CO. MONTANA

Mine office: Clancey, Jefferson Co., Mont. John Hamilton, superintendent, at last accounts. Property shows veins in granite that carry bunches and small oreshoots of auriferous and argentiferous copper and zinc sulphides. Is a well-known silver mine intermittently worked for 20 years. Equipment includes a steam plant and air compressor.

LLOYD CONSOLIDATED COPPER CO. ARIZONA

Idle. Mine near Turkey, Yavapai Co., Ariz. E. T. Teter, pres.; L. B. Nash, treas., at last accounts. Capitalization \$1,000,000, shares \$1 par. Lands, in the Squaw Peak district, 15 miles east of Turkey, carry a mineralized zone, developed by a 125' shaft. Equipment includes a 40-h. p. gasoline hoist and a small electric plant for power drills and lighting.

LLUVIA DE COBRE MINING CO. MEXICO

Idle. Office: 711 Kansas City Life Bldg., Kansas City, Mo. Mine address: Carbo, Sonora, Mex. Job Hollinger, pres.; W. M. Rynerson, vice-

pres.; Edgar Hubbard, sec.-treas.; J. C. Worthington, gen. mgr.; Thos. Lake, supt., at last accounts. Organized Nov., 1904, under laws of Arizona, capitalization \$3,000,000, shares \$1 par, increased, 1907, to \$5,000,000.

Lands, 283 acres, on San Juan mountain, in the Papago district, 30 miles west of Carbo, show silver-bearing sulphides, selected samples assaying 33% copper, 560 oz. silver and \$7 gold per ton. Development is by the 410' Josephine shaft, with several thousand feet of level work.

Equipment includes a 10-drill air compressor. Is not regarded favorably, the company's advertising having been decidedly lurid. Closed down 1907, resumed 1909, and was developing with a small force at last accounts.

LODI GOLD & COPPER CO.

NEVADA

Idle. Office: 59 Commercial Bldg., Salt Lake City, Utah. Mine near Rhyolite, Nye Co., Nev. Jacob Evans, pres.; H. P. Henderson, vice-pres.; Samuel L. King, sec.-treas., at last accounts. Organized May, 1907, under laws of South Dakota, capitalization \$1,250,000, shares \$1 par, nonassessable; issued, \$850,000.

Lands, 25 claims, unpatented, adjoin the Lodi Mines Co., on the north and are in Skull valley, 40 miles from a railway. Development is by a 100' shaft, showing mainly auriferous and argentiferous lead ores.

LOG CABIN MINING & MILLING CO.

IDAHO

Property, a silver-lead mine near Wallace, Shoshone Co., Idaho, is idle except for annual assessment work.

LOGAN COPPER CO.

ARIZONA

Idle. Office: 1008 Commerce Bldg., Kansas City, Mo. Mine office: Skull Valley, Yavapai Co., Ariz. Jos. Knoche, pres.; M. C. Tubbs, vice-pres.; F. D. Barr, gen. mgr.; Louis Tippe, sec.-treas., at last accounts. Organized Dec. 7, 1906, under laws of Arizona, capitalization \$1,000,000, shares \$1 par.

Lands, 11 claims, 215 acres, are in the Copper basin, 5 miles northeast of Skull valley, the nearest rail station, and 23 miles southwest of Prescott. Property shows Yavapai schists, with deposits of iron gossan showing copper carbonate ore. Development is by a 160' tunnel, and a 155' two-compartment shaft, having levels opened at 35', 65', 80', 95' and 115, which is poor practice. Ore shows melaconite, malachite, chalcocite and chalcopyrite, giving average assays of about 4.5% copper. Equipment includes a 40-h. p. steam hoist, good for 1,000' depth.

LOGOS MINES CO.

ARIZONA

Office: 650 West 27th St., Los Angeles, Cal. Mine office: Mayer, Yavapai Co., Ariz. Dr. Sara Thacker, pres., sec. and gen. mgr.; Henry W. Thacker, vice-pres. and treas.; preceding officers and Earl H. Tate, directors. Organized June, 1906, under laws of Arizona, capitalization \$1,000,000, shares \$10 par. Lands, 46 claims, partly patented, 900 acres, and 320 acres of miscellaneous lands, in the Big Bug district, 8 miles southeast of Mayer. Development is by a 180' shaft, and a 190' tunnel, with 2,000' of workings, besides considerable surface work. Equipment includes a 40-h. p. gasoline hoist and 2-drill air compressor. Developing in a small way at last accounts.

LOLITA MINES CO.

MEXICO

Idle. Office: Merrill Bldg., Milwaukee, Wis. Wm. G. Gruber, pres. and mgr.; Arthur H. Gruber, sec., at last accounts. Lands, 538 acres, in the San Blas mountains, about 20 miles from Barreal, are slightly developed by numerous shallow shafts. Inactive several years and not favorably regarded.

LOMA DE TORO, S. A.: NEGOCIACION MINERA.

MEXICO

Mine near Zimapan, Hidalgo, Mex. Enrique Langenscheidt, manager,

at last accounts. Organized July 2, 1897, under laws of Mexico, capitalization 84,000 pesos. Lands include the Loma de Toro, La Luz, San Antonio, San Miguel and Monserrate mines, all carrying auriferous and argentiferous lead, copper and zinc ores, developed by tunnels.

LOMBARDY MINING & MILLING CO.

IDAHO

Office and mine: Kellogg, Shoshone Co., Idaho. Peter Albinola, pres. and gen. mgr.; Hon. Herman J. Rossi, vice-pres.; Edw. Albinola, sec.-treas. Organized April, 1898, under laws of Idaho, capitalization \$1,000,000, shares \$1 par. Annual meeting, fourth Thursday in April.

Lands, 15 claims, show a bedded vein, estimated to average 27' wide with shale footwall and quartzite hanging and traced for 800'. Ore is said to carry variable values in copper, up to 47% lead and 33 oz. silver per ton. Development is by tunnels of 360' and 900', with about 1,500' of workings. Idle except for annual assessment work.

LOMITA MINING CO., S. A.

MEXICO

Is the Mexican incorporation of the Elenita Development Co., which see.

LONDON ARIZONA CONSOLIDATED COPPER CO.

ARIZONA

Office: 723 Title Insurance Bldg., Los Angeles, Cal. Mine office: Winkelman, Gila Co., Ariz. Chas. E. Finney, pres.; Robert J. Simpson, sec.-treas.; Volney D. Williamson, Walter A. Burrell, John A. Finch, Robert Sweeny, B. P. Cheney, J. H. Neff, Richard E. Sloan and Frank M. Murphy, directors. Edward W. Brooks, cons. engr. and geologist. Henry Kehoe, engr. in charge of operations.

Organized Sept. 18, 1913, under laws of Maine, as a merger of the London Arizona, London Range, London Shamrock and Ball Copper companies. Capitalization \$12,000,000, shares \$5 par, fully paid and nonassessable. Bonds, \$207,300, 6% outstanding. Citizens Trust & Savings Bank, Los Angeles, registrar. Annual meeting, first Tuesday in October. Company starts out with a treasury fund of \$500,000.

The property forms a compact group covering a mineralized area showing a series of 1,500' of well-bedded limestone, quartzite and shales resting on a laccolithic mass of diabase; these rocks are broken, faulted and later intruded by dikes and sheets of diorite porphyry, presumably the offshoots of an underlying batholithic mass of granitic material. The ore occurs in contact metamorphic deposits and replacements, especially in the limestone. Much of the ore consists of garnet (andradite, the lime and iron species) intergrown with specular hematite, copper sulphides and a variety of iron-magnesian lime silicate minerals. The copper ore occurs largely in "blanket" deposits, but also in fissures and vertical contacts. The main ore outcrop is 10 to 30' wide and about three-fourths of a mile long, lying between beds of limestone and quartzite.

Silver-lead ores do not occur in the contact deposits, but are found in limestone along dike contacts where contact alteration is not noticeable. Some 2,000 tons of lead carbonate ore have been shipped since Jan., 1913, averaging 28% lead and 3 oz. silver per ton.

Development includes the 272' Curtin shaft, the 182' Arizona, 190' Red Bird and 90' O'Carroll shafts, total underground development amounting to 2,500'. Details concerning the various tracts will be found under the titles of the companies named above.

The new organization plans development work on a comprehensive scale. It has already ordered new machinery and plans to sink the Curtin and Arizona shafts with 3 compartments, the first to 1,200', the latter to 1,000' in depth. The company has a strong directorate, an experienced management and promises to become an important producer.

LONDON-ARIZONA COPPER CO.**ARIZONA**

Office: 723 Title Insurance Bldg., Los Angeles, Cal. Mine office: Winkelman, Pinal Co., Ariz. Chas. E. Finney, pres.; Chas. S. Gleed, vice-pres.; Robt. J. Simpson, sec.-treas.; Edw. W. Brooks, cons. engr.; preceding officers, J. H. Neff, B. P. Cheney, A. C. Finney, Chas. E. Finney, Jr., R. J. Finney and Richard E. Sloan, directors; Harry Scott, supt.

Organized April 12, 1907, under laws of Arizona, capitalization \$10,000,000, shares \$10 par; issued, 573,000 shares. Debentures, \$152,000 at 6%. Company merged with London Range, London Shamrock and Ball Copper companies as the London-Arizona Consolidated Copper Co., a Maine corporation, in Sept., 1913, and now holds 768,054 shares of the capital stock of the new company.

Property, 68 claims, 1,257 acres, known as the Dripping Springs or O'Carroll group, on London mountain, in the Banner district, 7 miles north of Winkelman.

Property shows limestone of the upper carboniferous series, resting on quartzite, and cut by dikes of porphyry. The limestone series has the same members as in the Globe district, and the ore deposits occur similarly, as replacements in limestone. The basal quartzite caps a great monzonite laccolith, which presumably is the primary source of the ore, and is said to carry copper values of about 2.5%, in disseminated chalcopyrite and chalcocite. The limestone shows an ore-bearing ledge about 30' wide, traceable 4,000'.

The property has about 4,000' of old workings, remaining from former ownership, showing considerable carbonate ore of 5% estimated average copper tenor. Development is by 2 shafts, deepest 272', and 4 short tunnels, aggregating 636' in length, with about 1,000' of new workings. Equipment includes 3 gasoline hoists and 2 air compressors of 8 drills capacity. Property considered promising. A full report on the property was made by E. W. Brooks, E. M., 1907.

LONDON-GILA MINING & POWER CO.**ARIZONA**

Mine office: Winkelman, Pinal Co., Ariz. Dr. N. H. Morrison, pres. and gen. mgr.; S. H. Stewart, sec., at last accounts. Organized May, 1908, capitalization \$3,000,000.

Lands adjoin the London & Arizona, near London mountain. Drill boring, 1910, is said to have shown considerable quantities of low-grade copper ore, with some native copper. Idle and presumably moribund.

LONDON MOUNTAIN COPPER CO.**ARIZONA**

Office: 526 Security Bldg., Los Angeles, Cal. Mine office: Christmas, Gila Co., Ariz. O. A. Turner, pres.; H. S. Turner, sec.-treas.; Theo. Phillips, gen. mgr., at last accounts. Organized May, 1908, capitalization \$15,000,000, shares \$5 par. Lands on London mountain, adjoining the London-Gila, London-Arizona and London-Range properties. Development is by 3 shallow shafts and a 270' tunnel, drifting for an ore zone said to be 100' wide at surface. The property is said to show auriferous and argentiferous copper sulphides of about \$15 per ton average values. No recent returns secured.

LONDON-RANGE COPPER CO.**ARIZONA**

Office: 723 Title Insurance Bldg., Los Angeles, Cal. Mine near Winkelman, Gila Co., Ariz. Chas. E. Finney, pres.; Robt. J. Simpson, sec.-treas.; Edw. W. Brooks, cons. engr.; Hon. Richard E. Sloan and F. L. Wright, directors. Harry Scott, supt. Organized Dec. 28, 1907, under laws of Arizona, capitalization \$6,000,000, shares \$10 par; issued, \$2,000,000. Bonds, \$68,500 issued. Annual meeting, second Tuesday in January.

Company heretofore controlled by ownership of practically all the

issued stock, by the London Arizona, has transferred its property to the new London Arizona Consolidated Copper Co. and its charter will be given up.

Property consisting of 30 claims, 500 acres, with the 182' Arizona shaft, a 50' prospect shaft and a 75' tunnel, will hereafter form an integral part of the tract owned by the newly organized company.

LONDON SHAMROCK COPPER CO.

ARIZONA

Office: 723 Title Insurance Bldg., Los Angeles, Cal. Mine at Winkelman, Gila Co., Ariz. Chas. E. Finney, pres.; Edw. W. Brooks, vice-pres. and cons. engr.; Robt. J. Simpson, sec.-treas. Organized July 21, 1910, under laws of Arizona, capitalization \$1,000,000, shares \$10 par, nonassessable.

The company's property, 18 claims, 300 acres, including the Red Bird mine, was sold to the London Arizona Consolidated Copper Co., Sept., 1913, and the corporation will be dissolved.

LONE STAR CONSOLIDATED COPPER CO.

ARIZONA

Letters unanswered from Safford, Graham Co., Ariz. Hon. Wm. H. Powers, pres.; Duncan McVichie, vice-pres.; Henry H. Folsom, sec.; A. G. Smith, treas.; S. S. Campbell, gen. mgr.; Chas. B. Spalding, supt. Organized Aug. 6, 1906, under laws of Maine, capitalization \$5,000,000, shares \$10 par, practically as successor of Maravilla Copper Co.

Company controls the Mineral Mountain Copper Co., through ownership of a two-thirds share interest, and controls, through majority stock ownership, the Chase Creek Copper Co.

Lands, 32 claims, including the Little Clara mine, having a tunnel and shaft, and the Lone Star mine, in the Gila mountains, 10 miles north of Solomonville, having a 900' shaft showing a 5' vein of sulphide ore, claimed to carry 8 to 10% copper, with fair silver values and a little gold. The shaft also shows stringers of ore giving assays of 5 to 20% copper. Presumably idle.

LONE STAR COPPER MINING CO.

WASHINGTON

Office: P. O. Box 2107, Spokane, Wash. Oscar De Camp, pres.; Wm. S. Thyng, sec. and engr., and R. C. Rimertsen, directors. Organized April, 1910, under laws of Washington, practically as a reconstruction of the Copper Hill Mining & Milling Co., capitalization \$1,500,000, shares \$1 par. Lands, sundry claims, including the Copper Hill mine near Newport, Stevens Co., Wash., developed by several shallow shafts and tunnels. Mine has an 18' vein, carrying chalcopryrite, disseminated in pyrrhotite. There is no machinery. Idle several years, except for annual assessment work.

LONE STAR MINE.

WASHINGTON

W. D. Barnard, manager, Okanogan, Wash. Property, the Lone Star mine, situated on Salmon river, above Conconully, Okanogan Co., Wash., and reached by the Oroville-Wenatchee branch of the Great Northern railroad to Okanogan. Property controlled by the Syndicate Development Co. First shipments made in July, 1913.

LOOKOUT COPPER CO.

ARIZONA

Idle. Office: 11 Pine St., New York. Mine office: Poland, Yavapai Co., Ariz. Orleans Longacre, Jr., vice-president and general manager. Is controlled, through ownership of \$1,716,300 stock, by Development Company of America. Lands, in the Slate Creek district, have a 350' shaft, and the mine has steam power.

LOON CREEK MINING & INVESTMENT CO.

IDAHO

Idle. Office: Blackfoot, Idaho. Mine office: Ivers, Custer Co., Idaho. E. H. Watson, pres.; J. M. Stevens, sec. Lands, about 2 miles from the Lost Packer, have a tunnel showing high-grade auriferous copper ore.

LOP EAR MINE.**ARIZONA**

Office: Mayer, Yavapai Co., Ariz. Hill Bros., owners. Property, a few claims near Mayer, showing fissure veins developed by shaft, whose levels show a shoot of high-grade copper ore (25%) carrying gold and silver values. Made small shipment in Sept., 1913.

LOPER & CARNEY MINE.**ARIZONA**

Property, 8 miles east of Hackberry, Mohave Co., Ariz., in the Cottonwood district. Claims show a small vein of copper ore said to average 3% copper and 5 oz. gold per ton. Principal development is by shaft 54' deep at last accounts.

LORETA y PROVIDENCIA; COMPANIA MINERA.**MEXICO**

Mine office: Jesus Maria Ocampo, Rayon, Chihuahua, Mex. E. R. Bones, mgr.; Jesus Poyval and Rascon Hnos., owners. The mine has a 500' main shaft and a 900' tunnel, developing argentiferous copper and lead ores. Equipment includes a 10-stamp mill, of 25 tons daily capacity, a small leaching plant, and a 1-ton smelter. Mine has water power and employs about 50 men.

LORETTA MINING CO.**CALIFORNIA**

Mine office: Big Pine, Inyo Co., Cal. John G. Kirchen, mgr.; John Cole, supt. Is controlled through stock ownership by Chas. M. Schwab and the Gail Borden Estate. Lands, about 750 acres, east of Bishop, have a 40' vein, carrying ore said to average 4% copper and about \$3 gold per ton. Development is by a 865' main shaft, said to be in commercial ore, and 2 crosscut tunnels to the northeast, 1 of 90' length said to have cut a 74' vein. Improvements include a smithy and several small mine buildings. Was developing with a small force at last accounts and planning, 1912, to install a 100-h. p. electric hoist.

LORRAINE COPPER MINING CO.**WASHINGTON**

Idle. Mine office: Keller, Ferry Co., Wash. Owen Jones, pres.; A. G. Rockwell, sec.; Fred J. Chamberlain, gen. mgr., at last accounts. Organized April 13, 1900, under laws of Washington, capitalization \$1,500,000, shares \$1 par.

Lands, 22 claims, 422 acres, in 2 groups, and a 20-acre mill site, in Ferry and Pierce counties, Wash.

The Wilmot group, in the San Poil district, Ferry county, shows contact deposits between porphyry and schist. The ore is of 4 to 6' width, and said to give average assays of 6.5% copper, 40 oz. silver and \$4 gold per ton, showing malachite and azurite near surface, and chalcocite, bornite and chalcopyrite at depth.

The Lorraine group, in the Carbon River district, shows fissure veins in granite, having bornite and chalcopyrite ores, which assay up to 20% copper, 5 oz. silver and \$1 gold per ton. This group is opened by 2,016' of workings with 4 shafts, deepest 100', and by 8 tunnels, longest being 630'. No trace of operations secured.

LOS ANGELES GEM CO.**ARIZONA**

Office: Los Angeles, Cal. Mine office: Kingman, Mohave Co., Ariz. E. E. Peck, pres. and gen. mgr.; C. W. Morrell, sec.-treas. Property includes a variscite mine in Esmeralda county, Nev., but the principal property is the George Washington group of 6 claims in Mineral Park, near Kingman. This property carries a vein of 18 to 24" width, developed by a 143' upper tunnel and a 370' lower tunnel, showing ore assaying up to 4% copper, 200 oz. silver and \$4 gold per ton. The company mined turquoise from the claims for some years, before developing copper. Equipment includes gasoline hoist.

LOS CERROS COPPER CO.**CUBA**

Idle. Office: Blackstone Bldg., Cleveland, Ohio. Mine office: Fomento, Santa Clara, Cuba. W. I. Boardman, pres.; W. C. Watkins, vice-pres.; Sherman C. Dalbey, sec.; W. L. Rees, treas.; Col. D. H. Pond, gen. mgr., at last accounts. Organized Aug. 12, 1905, under laws of Arizona, capitalization \$500,000, shares \$100 par.

Lands, 2 claims, 100 acres, also 1,500 acres miscellaneous lands, opened by shafts of 25', 35', and 50', and by tunnels of 80', 80', 200', 205' and 250', showing ore assaying 10% copper, 20 to 25% zinc, 20% sulphur and 30% silica, with gold and silver values. Zinc apparently decreases at depth. The vein has a 12 to 15' gossan outcrop along its strike. Property is an antigua, last operated in 1750. The ore though mostly low-grade zinciferous can be concentrated and property is considered worthy of further development under competent direction.

LOS MUERTOS MINING CO.**MEXICO**

Mine office: Velardena, Cuername, Durango, Mex. Carter Barker, superintendent, at last accounts. Mine has argenteiferous lead and copper ores, with steam power. No returns secured.

LOS PLATANOS MINING CO.**MEXICO**

Office: 516 Grant Bldg., Los Angeles, Cal. Mine office: Choix, Fuerte, Sinaloa, Mex. A. M. McDermott, pres. and gen. mgr.; C. F. Iredell, vice-pres.; J. L. Davidson, sec.; preceding officers, R. E. Small and W. W. Thomas, directors; E. B. Hosford, mine supt. Organized Dec., 1909, under laws of Arizona, capitalization \$1,200,000, shares \$10 par, nonassessable; issued, \$280,000. Operates through Compania Exploradora de Los Platanos, S. A., organized under laws of Mexico. Merchants' Trust Co., Los Angeles, transfer agent. Annual meeting, first Monday in October.

Lands, 39 pertenencias, 96 acres, bought of Choix Consolidated Mining Co., Ltd., 3 miles from Choix, and 40 miles from Fuerte, the nearest rail point. The eastern extension of the Kansas City, Mexico & Orient railway is planned to pass within 10 miles of mine.

Property shows an intruded mass of diorite, cut by later dikes of andesite, developing fracture and shear zones, giving 2 ore zones, of 30 to 100' estimated width with length of 2,500'. These zones carry ore shoots connected with a system of cross-fractures. The upper portion of 1 of these veins shows occasional flakes of native copper, near surface, succeeded by a leached zone. The other vein is entirely leached near surface, except for occasional copper stains, and small bunches of ore. Ore is estimated by management to average 7% copper, 1.5 to 2 oz. silver and 60 cts. to \$1.50 gold per ton.

Development includes 1,500 of workings with a 240' shaft, and incline tunnels of 600' and 300', known as the Iglesia and Abundancia mines, estimated by the management to show 12,000 tons of ore. Records of 1,093 tons of ore shipped show average returns of 21.8% copper and 5.5 oz. silver per metric ton. The discard from these shipments, about 7,500 tons, is estimated to average 4% copper and 1.5 oz. silver per ton, and the management estimated a total about 12,000 tons of ore on the dump, 1911. Equipment includes a hoist, and several buildings.

LOS SAUCES; MINA DE.**MEXICO**

Frank B. Hines, manager, at last accounts. Mine at Santa Maria del Oro, Durango, Mex., is opened by shafts. Ores contain gold, silver and copper. Property has a steam plant, is equipped with a 50-ton smelter and employs about 100 men when actively working.

LOST CABIN MINING CO.**WYOMING**

A. B. Elrick, superintendent, Shoshone, Fremont Co., Wyoming. Prop-

erty, the Lost Cabin group, with the Summit vein in the Boyeson section. Development by shaft and tunnel, has been intermittent.

LOST PACKER EXTENSION MINING CO.

IDAH0

Mine office: Ivers, Custer Co., Idaho. W. W. Chisholm, pres.; Col. O. P. Chisholm, sec.-treas. Lands are near and supposedly adjoin the holdings of the Lost Packer Mining Co., No trace of operations securable.

LOST PACKER MINING CO.

IDAH0

Office: 724 E. Second South St., Salt Lake City, Utah. Mine and works office: Ivers, Custer Co., Idaho. Jas. Ivers, pres.; J. T. Finlen, vice-pres.; Henry Welsh, sec.-treas.; preceding officers, J. Frank Judge and H. M. McCormick, directors; J. P. Boyle, mgr. Organized under laws of Utah, capitalization \$150,000, shares \$1 par. Company declared a dividend of 25 cts. a share, Oct., 1913.

Lands, 32 claims, 4 patented, in the Loon Creek district, 112 miles west of Mackay, the nearest rail point, the mine being seriously handicapped by inadequate transportation facilities. The mine and smelter are located high in the mountains, only accessible by steep and dangerous trail and hampered by such deep snows that the smelter can only be run a short time (24¾ days in 1913). Development is by drift tunnels, No. 1 having a back of 450', No. 2 a back of 700', and No. 9 a back of 870', latter showing rich ore, and planned to have a back of 2,000', ultimately. Tunnels are drifts on a vein of 2 to 7' average width, with maximum width of 15 to 18', carrying ore averaging 2 to 6% copper, and \$2 to \$8 gold per ton, with a paystreak of 2" to 5' width, proven to average about 2' for a distance of 500' and depth of 400'. The ore is said to average 10 to 25% copper, 10 to 12 oz. silver and \$40 to \$75 gold per ton.

Company employs 80 men at the mines and 300 horses are required to handle supplies and output.

About \$225,000 has been expended on surface improvements and equipment, including the smelter. The property has water power, with an electric-light plant, assay office and necessary mine buildings.

The smelter has a 100-ton water-jacket blast furnace, making matte of about 45% copper, 25 oz. silver and 8 to 10 oz. gold per ton, with slags running only about 0.2% copper. The smelter ran 24¾ days in the summer of 1913, smelting 1,800 tons of ore, and producing 380 tons of matte.

The property, though very difficult of access, and having many features unfavorable to operations, is of exceptional promise.

LOST PACKER MINING & SMELTING CO.

IDAH0

Office: 34 West 33rd St., New York. Mine near Ivers, Custer Co., Idaho. John T. Clarke, treasurer and managing director. Organized 1907, under laws of Wyoming, capitalization \$3,000,000, shares \$5 par, as a holding company, to gradually acquire the outstanding stock of the Lost Packer and other mining companies.

LOST RIVER COPPER CO.

IDAH0

Office: Idaho Falls, Idaho. Mine office: Nicholia, Lemhi Co., Idaho. Mine is said to have a 7' vein, between quartzite and limestone, carrying sulphide copper ore. Idle several years and apparently moribund.

LOUIS D'OR GOLD MINING CO.

ARIZONA

Office: 339 Monadnock Blk., Chicago. Mine office: Globe, Gila Co., Ariz. L. Ogden Wadleigh, pres.; Geo. P. Baldwin, vice-pres.; Neil McMillan, sec. and gen. mgr.; J. A. Glenn, treas.; preceding officers, Theo. A. Steller, Willis H. Smith, C. S. Andrews and L. W. Whitmer, directors; John S. Ross, supt. Organized July, 1912, under laws of Arizona, capitalization \$2,000,000, shares \$1 par; issued, 1,116,540. Company is practically a reconstruction of the Lost Gulch United Mines Co.

Lands, 19 claims, partly fractional, 283 acres, in 3 contiguous groups, about 2 miles north of the mouth of Lost gulch, and 3 miles from a railway. Property shows monzonite-porphry, diorite and granite, carrying 4 fissure veins, of which 3, of 4' estimated average width, are more or less developed, the mines as a whole having about 7,000' of workings. The Badger mine has a vein of 3 to 6' width, developed by a 145' shaft, somewhat wet, carrying ore averaging about \$7 per ton in values, with occasional shoots of \$17 to \$30 per ton, and a 400' tunnel showing a vein of 3 to 6' width, averaging about \$7 per ton. Equipment includes a 15-h. p. gasoline hoist, good for 400' depth. The Bonanza mine has a 1,050' tunnel. The Cedar Tree mine carries mainly argentiferous and auriferous galena, with a little copper and zinc. All ores are sulphide.

The mill, of wood, completed Feb., 1910, has 10 stamps, a 7x10" Gates crusher, 2 Wilfley tables, 2 Frue vanners and a Pierce amalgamator, power equipment including two 80-h. p. water-tube boilers and a 150-h. p. Corliss engine.

The property has been sadly mismanaged in the past and the present advertising campaign of the company is not liked, many points being stretched to help stock sales. The mine, however, seems to be of promise, if handled as a straight cyanide proposition, but must be considered a gold mine, as copper values are inadequate to warrant treatment alone and cannot be recovered if the ore is cyanided for gold.

LOUISIANA & ARIZONA MINING CO.

ARIZONA

Idle. Mine office: Jerome, Yavapai Co., Ariz. Organized Nov., 1908. Property, the Grand Island mine which adjoins the Copper Chief mine on the south, and is 30 miles south of Jerome. The mine, said to have a good surface showing, has a 100' two-compartment shaft, developing a 3' vein carrying low-grade copper ore. Equipment includes a steam hoist.

LOW CREEK COPPER CO.

WASHINGTON

Idle. Property, south of the Skykomish river, opposite Baring, King county, slightly developed.

LOW DIVIDE COPPER MINING CO.

CALIFORNIA

Idle. Office and mine: Crescent City, Del Norte Co., Cal. John Murray, president. Property consists of the Alta, Occidental and Copper Hill groups, on which several different veins have been opened by shallow workings which show oxide, carbonate and sulphide ores carrying good values in copper.

LOWER MAMMOTH MINING CO.

UTAH

Office: 516 Dooly Bldg., Salt Lake City, Utah. Mine office: Mammoth, Juab Co., Utah. John Dern, pres.; A. T. Moon, vice-pres.; A. Reeves, sec.; W. S. McCormick, treas.; J. C. Dick, gen. mgr; preceding officers, A. L. Jacobs, M. P. Braffet and D. L. Wertheimer, directors. Organized July 3, 1896, under laws of Utah, capitalization \$150,000, increased, 1906, to \$190,000, again increased, 1907, to \$250,000, and again increased, 1911, to \$1,000,000, shares \$1 par, assessable. Bonds \$60,000 authorized. To Nov. 1, 1908, company paid total dividends of \$57,000, and levied total assessments of \$127,500. Paid a dividend of 7½ cts., Dec. 29, 1909, bringing total dividends to \$65,073, and levied a 5-ct. assessment a few months later. Last assessment 1 ct., delinquent Oct. 17, 1913. Shares are listed on the Salt Lake Stock Exchange. Annual meeting, second Monday in January.

Lands, 6 claims, patented, adjoining the Mammoth and Grand Central mines, carrying a continuation of the Mammoth orebody. Development is by a 700' tunnel, and a 2,000' three-compartment shaft. The extensive workings, show large bodies of low-grade ore, decreasing in values with depth. The oxidized zone extends to depth of at least 1,800', ores to this

depth including lead carbonates, ruby silver and native silver. The copper ore occurs mainly on the footwall of the Mammoth vein, and is overlaid by silver-lead ore of smelting grade, the segregation of the copper and lead ores being remarkably complete. The lower workings in the sulphide zone show auriferous and argentiferous galena, chalcopyrite and pyrite, coming in at a depth of 1,800' to 2,000'.

Equipment includes 2 electric hoists, 1 of 165-h. p., with double drum, good for a half-mile depth, and an electric air compressor. Buildings include a carpenter shop, smithy, assay office and superintendent's dwelling.

Operations were suspended March, 1907, and resumed May, 1908, and in Dec., 1912, the mine was shipping zinc ore netting about \$20 per ton. Management considered good and property promising, notwithstanding the rather poor record of the past.

LOYAL LEASE CO., LTD.

BRITISH COLUMBIA

Mine address: Van Anda, Texada island, B. C. C. H. Jacobs, manager, at last accounts. Lands, 7 claims, 350 acres, near Blubber bay, 3 miles from Van Anda, show outcrops similar to those of the Marble Bay mine. Development is by a 300' shaft, showing chalcopyrite and occasional bornite, of good average tenor. Equipment includes a steam plant and 2-drill air compressor.

As the property was held under lease and bond from H. W. Treat, the company has presumably lost it and is now out of business.

LUCANIA TUNNEL & MINES CO.

COLORADO

Office: 205 Colburn Bldg., Denver, Colo. Mine office: Idaho Springs, Clear Creek Co., Colo. E. A. Colburn, pres. and gen. mgr.; John McColl, supt. Mine, developed by a 6,385' drainage and transportation tunnel, carries lead and copper sulphides. Equipment includes steam and water power, with an air compressor. Was developing with a small force at last accounts.

LUCIA MINING CO.

MEXICO

Office: 15 William St., New York. Mine office: Pánuco de Coronado, San Juan del Rio, Durango, Mex. Britton Davis, pres.; H. M. Hubbard, vice-pres.; Myra B. Martin, sec.-treas. Organized 1900, under laws of West Virginia, capitalization \$25,000, shares \$5 par. This company is controlled by the San Luis Mining Co., and its property is described under that title.

LUCILE DREYFUS MINING CO.

WASHINGTON

Idle. Office: 208 Columbia Bldg., Spokane, Wash. Mine at Danville, Ferry Co., Wash. C. B. Dunning, pres.; Geo. K. Stocker, treas., at last accounts. Development by 3 tunnels, showing a ledge of 100' estimated width, with paystreak of about 25', carrying argentiferous chalcopyrite, associated with pyrrhotite, closed down several years.

LUCILE GOLD & COPPER MINING CO.

CALIFORNIA

Idle. Office: 230 San Fernando Bldg., Los Angeles, Cal. C. B. Walworth, pres.; Frank L. Pitney, vice-pres. and mgr.; C. V. Boyd, sec.-treas. Organized Nov. 21, 1906, under laws of Arizona, capitalization \$1,000,000, shares \$1 par.

Lands, 5 claims, 100 acres, on the western slope of the Providence mountains, 11 miles from Kelso, having 2 veins, carrying mainly gold values, developed by a 60' shaft, and 2 tunnels, 27' and 200' long. Closed down several years.

LUCKY CALUMET COPPER MINING CO., LTD.

IDAHO

Office: Wallace, Idaho. Mine office: Mullan, Shoshone Co., Idaho. John H. Nordquist, pres. and gen. mgr.; Chas. H. Solberg, vice-pres.; Otto A. Olsson, sec.-treas., Eagle Block, Wallace, Idaho; preceding officers, John H. Wourms and O. A. Larson, directors; Al. J. Grills, supt. Organized

Oct., 1906, under laws of Idaho, capitalization \$1,500,000, shares \$1 par, assessable. Last assessment 5 mills per share delinquent Sept. 10, 1913.

Lands, 10 claims, patented, 181 acres, on Snowstorm hill, lie between the Independent and Snowstorm mines, and about 5 miles northeast of Mullan. Property shows 2 fissure veins of 10 to 50' width, in quartzite. Development is by 3 tunnels. The upper one of 1,400' length, has a quarter-mile of drifts and crosscuts, which develop what is supposed to be the extension of the Snowstorm vein, showing low-grade ore carrying disseminated carbonates and bornite of 2 to 3% estimated copper tenor. The lower tunnel, a crosscut, from the head of Gentle Annie gulch, is about 1,800' long and is planned to intersect the so-called Snowstorm vein at about 2,100' from the portal, at a vertical depth of 678', giving a back of 1,500' on the dip of the vein.

Equipment includes electric power, with 2 motors, and a 5-drill air compressor.

LUCKY FRIDAY MINING CO.

IDAHO

Idle. Mine office: Wallace, Idaho. Franklin Pfirman, pres.; LeRoy Slater, sec. Capitalization \$1,500,000, shares \$1 par. Lands, 4 claims, which adjoin the Hunter mine on the south. Mine has a 90' shaft, a 625' upper crosscut tunnel and a 700' lower crosscut tunnel, developing a 10' vein, with a 4' paystreak giving assays up to 3.5% copper, 29% lead and 89 oz. silver per ton.

LUCKY GROUP.

NEW MEXICO

M. D. Gaylord, manager, Brice, via Oro Grande, Otero Co., N. M. Property, the Lucky, May, Copper King and Lincoln claims in Jarilla district, at railway terminus, carrying malachite ore a few inches to 3' thick, lying in bedding planes and along seams and cross fractures. The ore averages 7% copper. A chimney of ore 50' wide is said to carry \$4 to \$11 per ton in gold, largely free.

Development is by tunnel, exposing several orebodies at 300' depth. In Sept., 1913, an experimental plant of the Dawson patent process was installed at the mine.

Production is at the rate of 50 tons per day carrying 2 to 5% copper and \$3.50 to \$10 gold with a bonus of \$2 for iron and lime. Employs 15 men.

LUCKY SWEDE GOLD & COPPER MINING CO.

IDAHO

Office: 625 Cedar St., Wallace, Idaho. Morris Pearson, pres.; G. W. Dougherty, sec.-treas.; L. F. Macejewski, A. J. Clark and Ida Pearson, directors. Organized May, 1909, capitalization \$1,000,000, shares \$1 par; assessable; last assessment 3 mills per share, delinquent Sept., 1913.

Property, 8 claims in the St. Joe district, southeast of Mullan, near the C., M. & St. P. R. R., having 3 veins carrying surface ores giving good assays in copper and gold. Development is by tunnel with about 600' of workings. Company's last assessment is to provide funds for a new 1,250' tunnel to start near the railway line and cut a copper vein. Equipment includes new compressor, installed 1913.

LUDWIG MINE.

NEVADA

Owned by Nevada Douglas Copper Co., at Yerington, Lyon Co., Nev.

LUEMA MINING CO.

COLORADO

Presumably idle. Office: Leadville, Colo. Warren F. Page, manager, at last accounts. Property, the Valley and Forest Rose mines, developed by a 450' shaft and 2,000' tunnel, shows silver-bearing copper and lead ores. Has electric power.

LUNING-IDAHO MINING CO.

NEVADA

Office: 356 Broadway, Los Angeles, Cal. Mine office: Luning, Mineral

Co., Nev. W. M. Willett, pres.; Robt. B. Todd, vice-pres. and gen. mgr.; S. W. Todd, sec.-treas. Organized April 29, 1910, under laws of Nevada, capitalization \$1,500,000, shares \$1 par; issued, \$834,748.

Lands, 14 claims, 280 acres, in the Santa Fé mining district, show several fissure veins in quartzite, said to carry 5½% copper, 2 oz. silver and about \$1 gold per ton. Property is only slightly developed.

LYCOMING CO.

MINNESOTA

Office: 708 Lonsdale Bldg., Duluth, Minn. Is a securities-holding company with a large share interest in the Cactus Copper Co.

LYNN & IDAHO MINING CO.

IDAHO

Idle. Office: Burke, Shoshone Co., Idaho. John Finley, pres.; Wm. Sellars, sec.-treas. Capitalization \$1,500,000. Property, a group of claims in the Hunter district, show quartz veins with gray copper ore and silver lead veins in slate. No recent work.

LYON COPPER CO.

ARIZONA

Reorganized as Arizona Merger Gold & Copper Co., which see.

MABEL COPPER CO.

ARIZONA

Mine near Tombstone, Cochise Co., Ariz. Geo. W. Swain, manager. Lands in the Dragoon mountains have a main shaft of about 300' depth and a 500' tunnel. Equipment includes a 60-h. p. engine and air compressor.

MACKAY IDAHO MINING CO.

IDAHO

Office: care Porter Stevenson, trustee, Mackay, Idaho. Property, the Columbia Standard mines, Nos. 1 and 2, held in trust.

MADERA MINING CO.

ARIZONA

Office: Helvetia, Ariz. Mine near Arivaca, Pima Co., Ariz. H. E. Brandt, pres. and gen. mgr. Organized Nov., 1907, under laws of Arizona, capitalization \$1,000,000, shares \$1 par. Lands, 16 claims, area 200 acres, near Old Baldy peak, in the Santa Rita mountains, Arivaca district, 70 miles south of Tucson, showing a 5' vein carrying auriferous and argentiferous bornite and chalcopyrite, developed by a 500' crosscut tunnel to be driven 1,200' to cut the vein. Equipment includes steam power and air compressor. Working in 1913.

MADERO HERMANOS.

MEXICO

Owned the Aurora y Anexas Co., operating near Marquez, Chihuahua, Mex. See that title.

MADIZELLE MINING CO.

ARIZONA

Office: Prescott, Ariz. Geo. U. Young, pres. and gen. mgr.; F. W. Taylor, sec.-treas., at last accounts. Organized 1906, under laws of Arizona, capitalization \$500,000.

Lands, 25 claims, 411 acres, in the Thumb Butte district, include the Derby and Centipede mines. Development is by shafts and tunnels, with about 5,000' of workings, showing auriferous copper ores. Equipment includes a small hoist, air compressor, a 5-stamp mill and necessary mine buildings. Idle at last reports.

MAGAZINE MINING CO.

ARIZONA

Idle. Property at Johnson, in Cochise county, is developed by 3 shallow shafts, showing ore of about 8% copper tenor.

MAGGIE MURPHY COPPER CO.

WYOMING

Office: care Chas. S. Ashley, president, New Bedford, Mass. Mine near Douglas, Converse Co., Wyo. Organized Aug., 1904, under laws of Wyoming, capitalization \$1,000,000, shares \$1 par.

Lands, 12 claims, 180 acres, and a 60-acre mill site, all fairly timbered, on the northwestern side of Horseshoe canyon, in the Laramie Peak district. Claims show granite, fissured with diorite, with gneiss and schists, carrying 7 veins between gneiss and mica-schist, of which 1 ranges 30 to

60' in width and shows covellite, bornite and chalcopyrite, ores holding pyrrhotite and assaying 1 to 6% copper, 2 to 9 oz. silver and 40 cts. to \$4.50 gold per ton.

Development includes 114' shaft and various shallow workings. Company has kept up necessary annual assessment work, but has done no development.

MAGISTRAL-AMECA COPPER CO.

MEXICO

Office: 201 Hibernian Bldg., Los Angeles, Cal. Mine office: Ameca, Jalisco, Mex. H. L. Percy, pres.; Fred M. Lyon, vice-pres.; Geo. C. B. Robinson, sec.-treas.; Jas. P. Harvey, gen. mgr., and H. N. Manington, directors; Percy A. Babb, cons. engr. Organized May 20, 1909, under laws of Arizona, capitalization \$1,500,000, shares \$1 par, nonassessable; issued, 1,255,300 shares. Holds direct title to lands through Magistral-Ameca Copper Co., S. A., organized under laws of Mexico. Annual meeting, second Wednesday in November.

Property bought of Las Moras Copper Mining Co. for \$100,000, by Messrs. Patrick Clark, Jas. P. Harvey, H. L. Percy and Fred M. Lyon, Mr. Clark selling his quarter interest to his associates for \$55,000.

Property, 74 pertenencias, 185 acres, known as the Mina Magistral, on the Hacienda Hegira, 8 miles southwest of Ameca, has veins in diorite that are cut by porphyry dikes. The veins occur on dike contacts and show outcrops of silicified rock with quartz stringers and hematite. The vein varies from 4 to 25' in thickness and carries lenticular orebodies connected by mere films of quartz or fissures with wall rock impregnated with chalcopyrite. The Magistral ore shoot occurs where 3 veins intersect. The ore carries copper sulphides and averages from 4 to 7% in copper with about \$2 in combined gold and silver values.

Development is by a 321' shaft, planned to be deepened to 350' and by tunnels with about 1 mile of openings, March, 1913, developing copper ground for width of 5 to 50', said to assay 4 to 8% copper. The Magistral was worked many years ago for bluestone, used by neighboring mines in the process of treating silver-lead ores.

Equipment includes two 80-h. p. high-pressure boilers and a 150-h. p. tandem compound engine, with hoist good for 500', at the Magistral. The mines are connected with Ameca by a good wagon road, 8 miles long, with a 1½% grade, built with the idea of using it for railway tracks in the future. About 100 men are employed.

The concentrator, of 50 tons capacity, tried the Elmore process without success. The original mill with jigs and tables has been remodeled and the ore is now treated by crushing through 3-stage rolls to 14 mesh and passing the entire pulp over Isbell concentrators. The middling is recrushed in a tube mill and passed over Wilfley tables. Management reports a saving of 75% of assay values, with concentration of 6 into 1, from ores averaging 3 to 5% copper, with small silver and gold values. Concentrates are shipped to the Aguascalientes smelter under contract.

Production in Sept., 1913, was 125 tons of ore daily, making 500 tons of \$80 concentrate monthly.

MAGISTRAL, S. A.; NEGOCIACIÓN MINERA DEL.

MEXICO

Office and mine: Aptdo 22, Zacatecas, Zacatecas, Mex. Dudley H. Norris, pres.; Chas. O. Gilbert, mgr. Company, which is operated as a very close corporation, is said to have paid for improvements from net earnings. Owns the Refugio de Magistral and San Roberto mines.

The San Roberto mine, about 300' deep, has iron ore carrying small values in copper, silver and gold, used for fluxing, and also has a little high-grade silver and silver-lead ore.

The Magistral mine carries chalcopyrite and galena, and ore is produced returning about 6% copper and up to 200 grams silver per metric ton. Development is by a 900' tunnel and 2 shafts, 1 of 400' depth, the second, with 3 compartments, is to be sunk 1,500'.

Equipment includes a 40-h. p. gasoline and 150-h. p. steam hoist, boiler plant, compressor, etc.

The reduction plant, at Magistral siding, on the Mexican Central line, connected with the mine by a narrow-gauge railway, includes a 50-ton sampling mill and a 200-ton smelter, latter blown in March, 1909. The smelter has a 250-ton El Paso Foundry & Machinery Co. blast furnace, with a movable forehearth, Connersville blower and 103' brick stack. Slags are highly silicious, and matte is sent for conversion to the Torreon smelter. Works treat about 2,000 tons of ore monthly, including a considerable amount of custom ore. About 150 men are employed.

MAGMA COPPER CO.

ARIZONA

Offices: 14 Wall St., New York, and Salt Lake City, Utah. Mine office: Superior, Pinal Co., Ariz. H. F. J. Knobloch, pres.; H. E. Dodge, sec.-treas.; W. H. Aldridge, managing director, and Jas. Neary, supt.; W. C. Browning, engr. Organized June, 1910, under laws of Maine, capitalization \$1,000,000, shares \$5 par. Company is controlled by Thompson & Gunn.

Property, the Silver Queen mine with 22 claims, 340 acres, and 50-acre mill site in the Pioneer district. Claims show a 40' fissure vein cutting through limestone and quartzite, about 20' being highly mineralized with a 4 to 6' paystreak carrying an average of 48% copper, 30 to 67 oz. silver and about \$4 gold per ton. Ore is mainly chalcocite.

Development is by an 800' shaft with considerable openings on the 300', 400', 650' and 800' levels, the last 2 showing large amounts of high-grade ore in the east drifts.

Equipment is electrical throughout but includes a 160-h. p. steam hoist, 2 air compressors driven by 225-h. p. motor, 3 vertical Aldrich pumps, 2 auto trucks for the transportation of ore and supplies between the mine and the station at Florence. Company was shipping regularly at rate of 500 tons monthly, April, 1913. About 50 men are employed.

Production for 1912 (last 2 months), 93,080 lbs. copper from 129 tons of 26% copper ore carrying 0.29 oz. silver and 0.07 oz. gold per ton. Company is diamond drilling its ground, 1913. Property is remarkably productive for its size and its future is decidedly promising.

MAGNA CHARTA MINE.

MONTANA

At Walkerville, Butte, Mont. W. A. Clark, owner. Property carries the extension of the Rainbow lode and is properly considered a zinc mine, though it carries copper in commercial amounts in some of its veins.

MAINE & NEBRASKA MINING CO.

MEXICO

Mine office: Rio Balsas, Guerrero, Mex. F. M. Currie, pres.; H. Lomax, sec.-treas.; A. E. Sedgwick, gen. mgr.; D. H. Harroun, mine supt., at last accounts. Organized 1907, under laws of Arizona, capitalization \$4,000,000, shares \$10 par, nonassessable.

Lands, 43 hectares, with a 4 hectare mill site and 9 hectares of miscellaneous lands. The Santa Lucia group has 4 contact deposits, between diorite and quartzite, of which 1, under development, estimated by management at 18' average width, carries copper sulphides, apparently mainly chalcopyrite. Development is by a 300' shaft and tunnels of 50', 300' and 600'.

The mine has a 250-h. p. steam plant. Property is served by a 1½-mile spur from the Mexican National railway. The works, include a small cyanide plant and a smelter having an El Paso Foundry & Machine Works

blast furnace, rated at 125 tons daily capacity. Company estimates costs as 70 cts. for mining, \$1.80 for concentrating, and \$1.80 per ton for smelting.

District unsafe and operations suspended 1911-13, on account of brigandage by Zapata's forces and general revolutionary disturbances.

MAIZ y CA.; JOAQUIN.

MEXICO

Office and mine: Villaldama, Nuevo León, Mex. C. Robles, manager, at last accounts. Property, the Blanca y Anexas mines, opened by tunnel, developing copper ore. Presumably idle.

MAJESTIC COPPER CO.

ARIZONA

Office: First National Bank Bldg., Kansas City, Mo. Mine office: Oracle, Pinal Co., Ariz. E. A. Hosier, pres.; W. A. Neiswanger, vice-pres.; E. T. Wilder, sec-treas. Company was organized under name of Inspiration Mining Co., but sold its property, in the Globe district, to the Inspiration Copper Co., and changed its name, March, 1909, to the present title, to avoid misunderstandings.

Property now consists of a group of 6 claims near Oracle, on which assessment work is done.

This company received from the sale of the Inspiration mine about \$1,500,000, paying a 10% commission to Messrs. Henry Krumb et al., for putting the deal through.

MAJESTIC COPPER MINING & SMELTING CO.

UTAH

Office: 79 Milk St., Boston, Mass. John M. Dick, president. To all practical intents and purposes this company was succeeded, 1904, by Majestic Copper Co., which was succeeded, 1908, by Majestic Mines Co., but the Majestic Copper Mining & Smelting Co. remains in existence, though practically the entire stock issue, and a large majority of the bonds, are owned by the Majestic Mines Co. The company became bankrupt, 1904, but paid 100 cts. on the dollar. Very fully described Vol. IV.

MAJESTIC MINES CO.

UTAH

Office: 342 Exchange Bldg., Boston, Mass. Mine office: Milford, Beaver Co., Utah. Wm. D. Elwell, pres.; John M. Dick, vice-pres.; D. J. Flanders, sec-treas.; Arthur Lovering and F. H. Bossom, directors. Alex. D. Moffat, mine mgr. Organized May 18, 1908, under laws of Maine, practically as successor of Majestic Copper Co. and Majestic Copper Mining & Smelting Co., capitalization \$5,000,000, shares \$5 par, assessable; issued, \$4,009,240.

Stocks of both companies were exchanged share for share for stock of the Majestic Mines Co. on payment of 15 cts. a share; bonds of the Majestic Copper Mining & Smelting Co. were exchanged for stock of the Majestic Mines Co., giving 900 shares of new stock for each \$1,000 bond. Of the outstanding bond issue of \$514,000 of the Majestic Copper Co., the Majestic Mines Co. owned \$381,900 at last accounts. Assessments of present company have been as follows: 15 cts. in 1908; 5 cts. in June, 1910; 10 cts. in April, 1911. Shares are listed on the Salt Lake Stock Exchange and the Boston curb. Federal Trust Co., transfer agent; State Street Trust Co., registrar, Boston, Mass.

Lands, 120 claims, 2,450 acres, in 8 groups, also an 80-acre smelter site, and 1,100 acres miscellaneous lands. The groups, located in 5 different districts of Beaver county, are the O. K., Old Hickory, Harrington-Hickory, Vicksburg, Hoosier Boy, Southern States, Larkspur, Copperfield and Treasurer, said to have about 100 orebodies, carrying copper, gold, silver, platinum, lead, cobalt, bismuth, vanadium and uranium. The company has platted the town site of Lewisville, where the smelter was located, and the property is served by the S. P., L. A. & S. L. R. R.

Five claims are under active development, 1913, and there are 18 shafts,

100 to 600' deep with a total of 6 miles of underground workings. The Old Hickory and O. K. mines yield copper ores, the others silver-lead ores.

The principal work of the present company is on the Old Hickory group of 9 claims, from which shipments are being made at the rate of about 100 tons ore daily, net earnings on these operations ranging from \$2,000 to \$5,300 per month. Smelter returns on this ore are given as 3.46% copper, 1.7 oz. silver and 39.7% iron.

The O. K. mine, 7 claims, formerly the principal producer, has a 400' three-compartment shaft, with a vein up to 20' in width, development being mainly on the 300' and 400' levels. This mine has more or less ore blocked out, in what apparently is a stockwerk, up to 250' in width, carrying stringers of high-grade ore. The O. K. mine was leased, 1913, the operators shipping a carload of ore in July that ran 28.8% copper, 28% silica and 15% iron with 3.8 oz. silver and 0.5 oz. gold per ton.

The Harrington-Hickory group of 25 claims, partly fractional, shows numerous fissure veins, intersected by cross veins, both approximately vertical, and, in addition, has a series of bedded veins, presumably following bedding planes, dipping at 30 to 35°, giving 3 separate intersecting systems of orebodies. Development is by a 600' two-compartment vertical main working shaft, with drifting in progress on the 500' level, where there is a body of high-grade ore, assays from which have given 1% copper, 37 to 55% lead, 18 to 22 oz. silver, and about \$1 gold per ton.

The Vicksburg group of 4 claims, formerly worked for gold, has 3 practically vertical fissures, of 2 to 20' width, with mineralized cross-fissures, developed by a 2-compartment working shaft, and numerous shallow shafts and pits. It is said that high-grade ore has been encountered at a depth of 150' in this mine.

The Larkspur group of 8 claims has a 60' contact deposit between granite and limestone, carrying irregular bunches of high-grade ore. The Copperfield group of 17 claims, lying between the O. K. and Old Hickory mines, is undeveloped. The Apex group of 4 claims adjoins the Old Hickory mine, and is practically without development. The Ben Harrison group is undeveloped.

Equipment includes steam and gasoline power for hoists, and electric power, for lighting and pumping, is taken from the Beaver River Power Co. There is a 34-h. p. Fairbanks & Morse gasoline hoist at the O. K. mine, and an electric hoist at the Harrington-Hickory shaft. The Harrington-Hickory has a 400-gal. electric pump and an Ingersoll-Sergeant air compressor.

There is an undeveloped water power on Beaver river, 35 miles distant, said to be capable of generating 2,000 h. p. and transmitting same electrically to the mine and smelter at a cost of \$100,000 for a hydro-electric installation and transmission line.

The reduction plant, at Lewisville, which is practically Milford, 3 to 8 miles from the various mines, includes a sampling mill and a smelter, with a 250-ton blast furnace for copper and a 100-ton lead stack. This smelter is small and antiquated, though run only about 40 days, and smelting only about 5,000 tons of ore. It was leased, Dec., 1908, for 5 years, with privilege of further extension and purchase, to the Miners' Smelting Co., organized by F. Augustus Heinze; which expended a little money in tinkering up the plant, but did not blow it in.

Company is now sinking a new 200' shaft at the Hickory mine and plans to develop the vein at that level.

MAJOR EVANS CONS. MINING & MILLING CO.

UTAH

Idle. Office: Provo, Utah. Mine office: American Fork, Utah Co.,

Utah. Jesse Knight, pres.; R. E. Allen, sec. Organized Jan., 1908, capitalization \$100,000, shares 10 cts. par. Shares are listed on the Salt Lake exchange. Lands, 31 claims, in American Fork canyon, having a 40' shaft and 150' tunnel, showing auriferous and argentiferous copper and lead ores.

MALAPAI MINING CO.

ARIZONA

Thos. Smyers, superintendent, Kirkland, Yavapai Co., Ariz. Property has fissure veins in schist, that carry gold-copper ores. Development by 850' shaft. Equipped with gasoline hoist and mill, with 1 Nissen stamp. Company employs an average of 15 men.

MALASPINA MINE.

BRITISH COLUMBIA

Office: care F. Pabst, 215 W. Ohio St., Chicago, Ill. Mine office: Van Anda, Texada island, B. C. Alfred Raper, general manager. Is owned by a close company, presumably not incorporated. Lands, 16 claims, 400 acres, showing limestone, diorite and porphyry, with 4 veins of 5 to 6' estimated average width. Mine has a 60' shaft and a 600' crosscut tunnel. Equipment includes a 50-h. p. steam plant, 20-h. p. hoist, and 3-drill Rand air compressor.

MALDEN MINING, MILLING & MFG. CO.

WASHINGTON

Office: Rosalia, Wash. Mine office: Metaline; Stevens Co., Wash. D. D. Birks, manager, at last accounts. Mine, opened by tunnel, is the only copper property in the camp, the other mines carrying lead ores. Equipment includes an air compressor. Idle.

MALONEY-BLUE LEAD COPPER MG. & SM. CO. SOUTH DAKOTA

Mine office: Sheridan, Pennington Co., S. D. John Harnan, pres. and gen. mgr.; Philip Harnan, vice-pres. and supt.; J. G. Thomas, sec.-treas. Organized 1899, capitalization variously reported as \$750,000 and \$3,000,000, shares \$1 par. Lands, 380 acres, showing a gossan of 118' claimed width, underlain by rich oxidized ores containing good copper and gold values. Development is by a 260' shaft, showing occasional stringers of ore, and a 1,610' tunnel, showing arsenopyrite. Developments to date have not shown copper in paying quantities, but commercial ore is believed to exist below the water level. Equipment includes a steam power plant and air compressor.

MAMMOTH-COLLINS MINE.

ARIZONA

Address: Schultz, Pinal Co., Ariz. Owned by Great Western Copper Co.

MAMMOTH COPPER MINING CO. OF MAINE.

CALIFORNIA

Office: 55 Congress St., Boston, Mass. Mine and works office: Kennett, Shasta Co., Cal. Wm. G. Sharp, pres.; Frederick Lyon and C. C. Rice, vice-presidents; preceding officers, B. Preston Clark, E. L. Carpenter, Jas. J. Storrow, and S. W. Winslow, directors; A. F. Holden, managing director; F. W. Batchelder, sec.-treas.; G. W. Metcalfe, mgr.; Robt. E. Hanley, mine supt.; W. J. O'Donnell, supt. Quartz Hill mine; Jas. H. Kerwin, smelter supt.; A. P. Anderson, engr.

Organized Aug. 2, 1904, under laws of Maine, capitalization \$2,500,000; \$1,500,000 issued, all owned by the United States Smelting, Refining & Mining Co.

Lands, 25 claims, partly fractional, patented, with an 80-acre smelter site and miscellaneous lands, giving total holdings of about 1,900 acres. The principal mineral holdings are on Little Backbone creek, west of Sacramento river, in the Big Backbone district. Lands are well timbered, with numerous mountain streams available for water supply and power. The country is very rugged, with mines opened near the tops of the mountains. Lands include a limestone quarry, but limestone for fluxing is now taken from Holt & Gregg's quarry, by electric cars. The company also

holds, under bond and lease, the Stowell, or Webster group of 23 claims, on Spring creek, between the Iron Mountain and the Balaklala mines. The Stowell mine is now under active development, 1913, and a long tunnel has opened up a large orebody. The mine has a new Ingersoll-Rand compressor and electric power. Extensive diamond-drill borings have been made.

The company's Iron Mountain mine, 120 acres, is at Fernley, Nevada county, Cal. This mine has a 12' fissure vein, in rhyolite, with a gossan up to 300' in width, traceable for a half-mile, and is opened by a 250' two-compartment vertical shaft, developing auriferous copper ores, including malachite and chalcopryite, associated with hematite and pyrite. Nearest rail point is Grass Valley, with a good wagon road connecting. Equipment includes boilers and a 25-h. p. double-cylinder link-motion geared hoist. Buildings include a power house, smithy and bunkhouse.

The Mammoth group, which is the principal property, lies on the western side of the Sacramento river. The orebodies consist of a series of long flat-lying lenses, occurring irregularly in a rhyolitic zone of pre-Devonian age, ore occurring mainly as replacements of porphyry in fissure and shear zones. Occasionally quartz phenocrysts are distinguishable, but usually little or no trace remains of the original rock. Ore carries chalcopryite, disseminated in massive pyrite and pyrrhotite, ranging 3 to 12% copper, 2 to 3 oz. silver and 60 cts. to \$1 gold per ton, with about 40% iron and up to 40% sulphur. The largest orebody has a maximum width of 228', with about 500' length. A chalcopryite orebody occurs along a porphyry contact on the northwestern extension of the mine.

Development is exclusively by 5 tunnels, with electric haulage. Mining is by the caving system. Ore reserves are estimated at about 2,000,000 tons and are maintained practically constant.

The Summit mine is about a mile from the Mammoth. Extensive diamond-drill work, 1910, has proven 7 orebodies, of good average tenor. Development is by tunnel.

The Quartz Hill mine, in the Old Diggings district, about 4 miles from the Mammoth smelter, is operated under a 5-year bond and lease, dated, 1912. The Quartz Hill mine carries lenses of low-grade ore, running about \$4 gold per ton and 93% silica, this mine being the largest producer of silicious ore in Shasta county, and furnishing fluxing ore and material for converter linings. About 50 men are employed. Equipment includes electric power and a 5-drill air compressor, and the mine is connected with the smelter by a 4-mile narrow-gauge railway.

The Buchanan mine has a small body of exceptionally high-grade ore, but has been idle several years.

The aerial tram proving inadequate, has been replaced by a combination ground tram of 3,500 tons estimated daily capacity, built to meet peculiar local conditions. The ground tram has 3 miles of standard-gauge steam railway line, from the smelter to the foot of the gravity road, the latter 4,000' long, with a drop of 1,700', connecting at the upper end with a 2-mile electric rail line leading to the mine. The gravity line cares for two 20-ton standard-gauge cars, operated in counterbalance, with a retarding device made to drive an air compressor. The transportation system of the mine includes 7 miles of narrow-gauge steam railway, equipped with 2 locomotives, 2 miles of electric line, a 4,000' gravity tram, and a 13,200' aerial tram.

The smelter, one-half mile from Kennett, and about 2½ miles southeast of the mine, occupies an 80-acre site. The works were built originally of 1,000 tons daily capacity, at a cost of \$500,000, and the smelter was

blown in Oct. 6, 1905, but was enlarged, 1907, to a capacity of about 1,800 tons daily, and again enlarged, 1909, to the present capacity of 2,250 tons, being the largest smelter in California. All buildings are of steel, and all material is handled by gravity, the design and system of operation being excellent. The plant works three 8-hour shifts daily.

The bin house, of steel frame, for storage of ore, coke and limestone, is 214' long, with capacity for 2,500 tons of custom ore and 100 tons of fluxing ore, in addition to coke and limestone, and has 27 scales for individual weighing of cars in train loads. In addition to the bin house, there are 4,500-ton bins at the lower branch of the aerial tram, and a 20,000 ton custom ore bin. Charge trains are run underneath the 3 sets of ore bins. The plant includes a sampling mill for custom ore.

The 72x222' blast-furnace building has three 42x180" and two 56x180" furnaces, designed by Carl F. Moore, with water jackets and steel tops, 1 furnace being held as a spare. Semi-pyritic smelting is employed, requiring only 3 to 4% coke charges. Notwithstanding the ore being zinckiferous, no furnaces have been lost by freezing, and when the zinc in the ore does not exceed 5%, Mr. Kerwin has run the furnaces with as small a coke charge as 2%, for short periods, and although ore has run as high as 10% zinc, increased fuel charges have obviated all trouble from freezing. This plant is notably successful in its handling of zincy ores, which are such a bugaboo in most smelters.

The 3 old furnaces have 6' 9" settlers, and the 2 new furnaces have 16' settlers, each with a water-jacketed top, of continuous-flow syphon type. The 3 new furnaces have water-jacketed tops with main jackets extending from the furnace bottoms to the charge floor, built in vertical sections, 2 end jackets extending from the furnace floor to the feed floor. The furnaces take a 42-oz. cold blast. Charge trains consist of four 5,000-lb. self-dumping charge cars, drawn by 4-ton Baldwin-Westinghouse electric locomotives, with tracks on either side of each furnace, charging alternately. Slags go into 6-ton cars, drawn by 6-ton Baldwin-Westinghouse electric locomotives. Matte is discharged from the spouts of the settlers into a traveling matte-casting machine, 40' long, from which chilled matte is dropped into 700-lb. barrows, first-fusion matte being resmelted.

The blast-furnace building has a 12x30' experimental reverberatory furnace, installed 1909, fired with California crude petroleum.

The 92x204' converter building has two 50-ton Morgan electric traveling cranes of 50' span, with two 15-ton auxiliary hoists, equipped with General Electric 440-volt induction motors. There are 2 Allis-Chalmers hydraulic stands, with room for a third, and eight 96x150" shells, taking second-fusion matte. The converters blow off into hoods leading to the old stack of the blast-furnace building, which has a self-supporting steel chimney 150' high and 12' in diameter. There is a slag-casting machine for converter slags requiring resmelting.

The relining department, in the converter building, has 400-ton bins for quartz and clay, two 7' Carlin grinding pans, and two Ingersoll-Rand pneumatic tamping machines, each on a hydraulic jib crane.

Fumes from the blast furnaces go through individual goosenecks to a brick dust flue, 200' long, with sectional area of 407', built in sections and provided with hopper bottoms, leading to a horizontal dust chamber, 30' wide, 15' high and 500' long, running to a 200' steel stack, of 18' diameter, standing on a 35' base. An electric tram-line running under the dust flue brings flue dust to the briquetting plant, in the furnace building, which has a 6-ton Chisholm, Boyd & White press, making briquettes from a mixture of flue dust and sulphide fines.

The 75x250' bag house, built by the American Bridge Co., at a cost of about \$250,000, was begun Oct., 1909, and required 750 tons of structural steel for the frame, which is sheathed with corrugated iron. There are 2 fans, each operated by a 400-h. p. electric motor. Fumes from the blast furnaces are drawn off by fans into the discharge chamber, then pass to the bag house through cooling pipes, each 200' long, said to reduce the temperature of the fumes from 400 to 200° F., free air being drawn in also to dilute the fumes. Equipment of the bag house comprises 3,000 woolen bags, each 18" in diameter and 30' long, through which the fumes pass. The bag house has capacity to handle fumes from 3 furnaces. The fumes leave the bag house by a number of small stacks, and bag house dust is briquetted and resmelted in the same manner as the product of the dust flue and dust chamber.

Both mine and smelter are operated by electric power, commercial current being taken from the Northern California Power Co., at a very reasonable rate. Current is delivered to the power house at 2,000 volts, the company requiring about 3,000-h. p. for the operation of its mines and works.

The steel roofed power house, at the smelter site, is 250' long, with installations aggregating about 2,300-h. p. Equipment includes 6 Connersville blowers, each with capacity of 124 cu. ft. of free air per revolution, at 135-r.p.m., driven by electric motors. A Nordberg air compressor, furnishing converter blast, is driven by a 750-h. p. General Electric motor. There are three 150-h. p. General Electric motors, three 200-h. p. Westinghouse motors, and two 100-h. p. motors.

The boiler house, 43x176' in size, is out of commission, owing to the use of electric power, but the boilers are held in reserve for emergencies.

The shops are in a single building, 41x432' in size, divided into sections, having a traveling crane with full span, and crane run for the entire distance. Three standard-gauge railway tracks run through the entire building, this being one of the best planned shops in existence. Miscellaneous buildings at the works include an office and laboratory.

Water, formerly raised from Blackbone creek by two 500-gal. centrifugal pumps, is now taken by gravity from the Butters' ditch, passing above the smelter and the pumps are held in reserve for emergencies.

The smelter treated 411,131 tons of ore in 1912, compared with 388,917 in 1911. The mine output for the year 1912 was 278,088 tons, of which amount the Quartz Hill mine yielded 29,923 tons of silicious ore. Output for 1911 was 270,330 tons. Employs about 1,200 men.

Production was about 12,000,000 lbs. fine copper in 1907; 30,000,000 in 1908; 27,000,000 in 1909; 22,000,000 in 1910; 18,000,000 in 1911 and 20,000,000 lbs. in 1912.

MAMMOTH MINE.

ARIZONA

Office: Mammoth, Pinal Co., Ariz. J. H. Hooper, superintendent. Owned by Calumet & Arizona Mining Co. Property shows fissure vein in granite porphyry, developed by 600' shaft. Has electric power plant and air compressor.

MAMMOTH MINING CO.

UTAH

Office: 409 Hooper Bldg., Salt Lake City, Utah. Mine office: Mammoth, Juab Co., Utah. Samuel McIntyre, pres. and gen. mgr.; Samuel McIntyre, Jr., vice-pres. and supt.; Col. R. M. Wilkinson, sec. Organized 1881, under laws of Utah, capitalization \$10,000,000, shares \$25 par, and reincorporated Dec. 5, 1906, under laws of Nevada, capitalization \$1,000,000, shares \$2.50 par. Controls the Cleveland Mining Co. through ownership of 70% of capital stock. Dividends, to end of 1912, were \$2,280,000, last having

been 15 cts., paid Oct. 10, 1912. As a result of 9 years litigation, a judgment in favor of the Grand Central Mining Co. was rendered, 1910, against the Mammoth Mining Co., and necessitated the levying of a 10-ct. assessment, 1910, the first in the history of the company. Annual meeting, first Tuesday in February.

The mine, opened about 1870, is developed extensively and has a 2,300' main shaft, the deepest in the Tintic camp. Irregular shoots and chimneys of lead and copper ores occur, values being mainly in silver and lead.

Equipment includes a complete plant, installed 1910, a mill with 30 stamps and all necessary buildings. Mine considered valuable.

MAMMOTH NO. 2 MINING & MILLING CO.

UTAH

Office: 409 Hooper Bldg., Salt Lake City, Utah. Mine at Mammoth, Juab Co., Utah. Wm. H. McIntyre, pres.; Samuel McIntyre, vice-pres. and treas.; Isaac Jennings, sec. Organized 1900, under laws of Utah, capitalization \$300,000, shares \$1 par, assessable; fully issued. Lands, 2 claims, patented, adjoining the Mammoth Mining Co., showing lead and copper ores. Idle several years.

MAMMOTH TUNNEL & MINING CO.

COLORADO

Property at Silverton, San Juan Co., Colo., was leased, 1903, to the Stony Pass Mining Co.

MANGAS DEVELOPMENT CO.

NEW MEXICO

Office: Silver City, N. M. Mine office: Tyrone, Grant Co., N. M. Hon. Norman W. Haire, pres. and gen. mgr.; Jos. E. Saint, vice-pres.; M. W. Porterfield, sec.; Jos. W. Selden, treas. Organized Oct. 2, 1909, under laws of New Mexico, capitalization \$500,000, shares \$5 par, of which 50,000 shares were issued, fully paid, in part payment for property, and 50,000 shares, half paid, rendered full paid by a \$2.50 assessment, levied 1910. First National Bank, Calumet, registrar. Annual meeting, second Tuesday in March.

Lands, 59 claims, approximately 2,000 acres, partly owned in fee, and partly held under option, lie near the Chemung and Savanna mines, on the northeastern slope of the Burro mountains, 12 miles northwest of Silver City.

The Porterfield-Robinson group of 22 claims, 353 acres, lies near the extreme southwestern edge of the favorable area of the district, the northern part being the more promising, showing iron stains, with some copper stains, and slip zones.

The Porterfield group has 17 claims, 340 acres.

The Malachite group of 5 claims, patented, 73 acres, is held from the Azure Mining Co., under a bond and lease, partly paid.

The Thompson group of 11 claims, partly fractional, 150 acres, held under option from the Ocala Mining Co., is 1 mile northwest of the Midway group, and has a 365' shaft on the Ocala claim, with a little drifting, and some assessment pits. The shaft showed high-grade copper oxides at surface, but has not reached the water level to develop sulphides.

The Tulloch group of 15 claims, 300 acres, on Edith mountain, held under a \$350,000 bond and lease, has a 50' shaft on the Dagger Point claim, showing some ore assaying up to 14% copper.

The Midway group of 18 claims, 10 fractional, 254 acres, carries the southwestern continuation of the ore zone of the Chemung Copper Co., and also lies near the Burro Mountain mine, with conditions markedly similar to those existing on these adjoining properties, on which large quantities of ore have been developed.

The orebodies are a combination of stockwerk and impregnation deposits, carrying values mainly along a series of small intersecting veinlets, having occasional masses of solid chalcopyrite up to several inches in size,

but with ore occurring mainly as minute particles of chalcocite, in veinlets, and as films on gangue rock. The orebodies vary greatly in size, with imperfectly defined walls, owing to impregnations, and some of the orebodies carry clay gouges. The copper impregnations, being disseminated through a gangue of decomposed eruptive rock, are of the type commonly called "porphyry ores," the term coming from the development of the Utah Copper Co. and Nevada Consolidated Copper Co., the mines of which carry disseminated chalcocite in a gangue of monzonite-porphyry, but in this camp the ore occurs in inclined "blanket" deposits, that are relatively thin and rather irregularly mineralized.

Acting on the advice of J. Morgan Clements, who reported favorably on the property, preliminary development was undertaken by churn drills, 1 Star and 2 Cyclone drills being employed, with holes put down checker-board fashion, at 200' intervals. A drill hole in Emerald gulch, 1910, showed sulphide ore from a depth of 350 to 700', apparently with the best ore near the bottom. Churn drills also cut the Humboldt vein, on the St. Paul claim, well mineralized for a width of 30'. Drilling was suspended, 1910, but in 1911 an exploratory shaft was started on the eastern side of the Tulloch group, in high-grade carbonate ore, and reached sulphides at comparatively shallow depth. The Midway group, when taken over, had 2 shallow shafts and a few pits, showing a little carbonate and silicate ore on the dumps, but these workings were too shallow to be of much importance.

Financial conditions caused the checking of the company's plans, but the management is good, and the property is considered promising, with a fair chance of developing into a large mine.

MANHATTAN CONS. MINING & MILLING CO. WYOMING

Idle. Office: La Crosse, Wis. Mine near Encampment, Carbon Co., Wyo. Wm. Doerflinger, pres.; Chas. H. Freeman, vice-pres.; P. J. Bott, sec.; Henry Tillman, treas., at last accounts. Organized Feb. 3, 1902, under laws of Wyoming, capitalization \$800,000, shares 10 cts. par.

Lands, 2 miles south of Encampment, showing a vein of 4 to 12' estimated width, carrying ore giving assays of 3 to 30% copper. Development is slight and only assessment work has been done for some years.

MANHATTAN COPPER MINING & MILLING CO. NEVADA

Mine office: Pioche, Lincoln Co., Nev. Hon. A. B. Lewis, pres.; Edw. F. Freudenthal, mgr., at last accounts. Is controlled, through stock ownership by the Consolidated Nevada-Utah Corporation, succeeding the Nevada-Utah Mines & Smelters Corporation. Company succeeded the Manhattan Gold & Copper Mining Co.

Lands, 2 groups, 1 east of Pioche and 1 in the Stampede Gap section. The Pioche group includes the Revenue, Telephone and Alps mines, with 100' and 140' shafts, showing ore assaying well in gold and silver. The Stampede Gap property has auriferous and argentiferous copper and lead sulphides, opened by a shallow shaft and 2 tunnels, with about 2,000' of underground workings.

MANHATTAN DEVELOPMENT CO. MEXICO

Office: Postoffice Blk., Houghton, Mich. Mine near Santa Cruz, Sonora, Mex. A. O. Koppes, supt.; J. H. Rice, pres.; W. G. Rice, sec.-treas. Organized March, 1905, under laws of Arizona, capitalization \$200,000, shares \$10 par; \$5.50 paid in.

Lands, 37 claims, 600 acres, owned in fee, in the California district, near Paradise, Cochise county, carrying upwards of 2 miles of the outcrop of a mineralized zone lying west and north of the holdings of the Chiracahua Development Co. Development is by several shallow shafts, deepest

80', and a 450' crosscut tunnel, latter showing leached ore and a little high-grade ore, with indications of permanent values at greater depth.

In August, 1913, company purchased the property of the Arnold Mining Co., near Santa Cruz, Sonora, for \$88,000. This property is developed by a 300' shaft and has recently been shipping 12% ore to the Cananea smelter. The company's previous operations have been mainly in the Yaqui region of Sonora.

MANHATTAN MINING & POWER CO.

COLORADO

Mine office: Twin Lakes, Lake Co., Colo. O. P. De Ford, manager, at last accounts. Development is by a 1,400' tunnel, showing copper and lead ores. Has water-power plant. No returns secured.

MANILA MINE.

WASHINGTON

Office: Keller, Ferry Co., Wash. Farr Bros., owners. Property, the Manila mine with 4 claims, a 20-acre reservoir and mill site, well timbered, with a 20,000' saw mill at the reservoir, in the San Poil district, 7 miles above the Columbia river and 4 miles west of Ferry, the nearest rail station. The Manila mine is on the summit of a mountain and shows a large deposit of disseminated chalcopryite ore estimated to be 70 to 100' wide, traceable 1,000'.

Development is by tunnels, the oldest 100' below the apex, another 150' lower. Mine was under option for \$60,000 to the Keller Indiana Co., now bankrupt, which put up a smelter in 1906, but failed to develop mine and property has supposedly reverted to original owners.

MANITOU HILL COPPER CO.

ARIZONA

Office: care W. H. Brown, secretary, 110 So. Third St., St. Joseph, Mo. Mine office: Globe, Gila Co., Ariz. A. T. Hammons, pres. and mgr. Organized 1911, capitalization \$1,250,000, shares \$1 par. Company is a reorganization of the Pinto Creek Mining & Smelting Co., and by consolidation later acquired the property of the Five Points Copper Mining Co.

Lands, 70 claims, at the head of Pinto creek, about 10 miles southwest of Miami, showing pre-Cambrian schists cut by granite and granite porphyry. Ore is mainly chalcocite, finely disseminated, and of low-grade generally, though pay streaks carry up to 12% copper with small silver and gold values.

The Pinto Creek group is developed by the 570' Yo Tambien shaft, showing a fair body of sulphide ore, the 70' Manitou shaft, and 8 tunnels, 3 longest 2,200', 2,150' and 1,100' long, with upwards of a mile of workings.

The Five Points group, some distance down the valley, is developed by the 150' Solace incline shaft, and the 350' Crackerjim shaft, sunk 1,500' apart. Property shows malachite near surface with some azurite and chalcocite at shallow depth.

Equipment includes a small steam plant and hoist at the Five Points mine, a 6-h. p. gasoline hoist, 6-drill air compressor, and a 250-ton concentrator at the Pinto Creek mine.

Property was in the hands of leasers at last accounts, the company apparently having done no work since 1912.

MANITOU MINING CO.

MICHIGAN

Idle. Office: 12 Ashburton Place, Boston, Mass. Mine near Delaware Mine, Keweenaw Co., Mich. Quincy A. Shaw, pres.; Rodolphe L. Agassiz, vice-pres.; Geo. A. Flagg, sec.-treas.; Jas. MacNaughton, gen. mgr., and Francis L. Higginson, directors. Organized June 26, 1905, under laws of Michigan, capitalization \$500,000, shares \$25 par. Is controlled, through ownership of the entire stock issue, by the Calumet & Hecla Mining Co.

Lands, 38,693 acres, including the Delaware, Eagle River, Eagle Harbor,

Montreal and New Jersey mines, the Delaware being the only property on which much work was done in the past, or under the present ownership.

The old Delaware mine, also known as the Conglomerate and Lac La Belle, and now called the Manitou, had about 3,700 acres of mineral lands and upwards of 17,000 acres of miscellaneous lands, with a water frontage of 10 miles on Lake Superior, and the entire frontage on Lac La Belle. This property expended, under various ownerships, about \$3,700,000, before passing to the present company. The old Delaware mine, opened on the Allouez conglomerate, has 4 shafts, of 300 to 900' depth, the Allouez bed underlying the greenstone and dipping northward at an angle of 25° 30'. The old workings were unwatered and found to give a fair showing of copper, and copper was found in the Medora amygdaloid underlying the conglomerate. The Delaware is exhaustively described Vol. II, under title of Pawnee.

MANSFIELD MINING & SMELTING CO.

ARIZONA

Office: 303 Midland Bldg., Kansas City, Mo. Mine office: Patagonia, Santa Cruz Co., Ariz. Frank D. Reasor, pres.; C. E. Sweet, sec.; Chas. L. Cookson, treas.; preceding officers, Herman A. Sutermeister, Harry J. Richards, A. W. Safford, R. W. Peirce, and A. E. White, directors; C. A. Pierce, gen. mgr.

Organized May 26, 1906, under laws of Arizona, capitalization \$8,-000,000, shares \$1 par, nonassessable; issued, \$7,112,556. Bonds, \$100,000 authorized, at 6%; issued, \$95,760. Annual meeting, second Monday in January.

Lands, 34 claims, 660 acres, and a 119-acre townsite at the station of Crittenden, all in the Wrightson district, 9 miles from the Nogales branch of the Southern Pacific railway. Property shows syenite, dacite, andesite and rhyolite tuff, said to show 9 orebodies, of 4 to 30' estimated width, of which 3, of 6' estimated average width, carry chalcopryrite, bornite, chalcocite and tetrahedrite, claimed to average 6% copper, 10 to 20 oz. silver and \$4 to \$10 gold per ton. The mine is developed by No. 1 shaft, of 360'; No. 2 shaft, of 140'; and 8 shafts of 50 to 100' each, with 10 tunnels of 100 to 250' length. The mine is reported to have 6,500' of workings. Equipment includes a 225-h. p. steam plant, with two 40-h. p. hoists and a 6-drill air compressor. There are 9 buildings, including an engine house, smithy, carpenter shop and store.

The smelter, at the mine, completed, 1908, is said to have cost \$21,900, and has a 30-ton blast furnace. The smelter is of little or no value, because of its toy size, and is idle. The company, as promoted, was a swindle, described Vol. VIII, and reorganization by the bondholders is in progress.

MAPIMI SMELTER.

MEXICO

At Santa Barbara, Chihuahua, Mex. Owned by American Smelting & Refining Co.

MARBLE BAY MINE.

BRITISH COLUMBIA

On Texada island, Howe sound, B. C. Owned by Tacoma Steel Co. and described thereunder.

MARICOPA MINES CO.

ARIZONA & NEVADA

Office: B. of L. E. Bldg., Cleveland, Ohio. Mine offices: Morristown, Maricopa Co., Ariz., and Austin, Lander Co., Nev. L. F. McGrath, pres.; P. J. Meade, sec.; Wm. H. Fowler, treas.; Francis L. Judd, mgr., at last accounts. Capitalization not reported.

Lands, 33' claims, 611 acres, in 2 groups, principal property being the Nevada group of 17 claims. This property, at Austin, shows 4 fissure veins in quartzite, ranging from 3 to 20' in width, traceable 1,400', and said to

carry average values of about 4% copper, 50 oz. silver and \$2.80 gold per ton.

Development is by 4 shafts of 800', 400', 320' and 197', and 5 tunnels, 2 longest being 2,000' and 830', with total underground openings of about 12,000'.

The Arizona property, known locally as the Prosperity group, 16 claims, in the Wickenburg district, shows granite and limestone, the ore occurring in fissure veins in porphyry. There are 6 known veins of 8 to 30' average widths, developed by numerous shafts, 2 principal shafts being 280' and 320' deep, with about 1,800' of workings. Ore is mainly chalcocite, claimed by the management to carry average values of 9% copper, 11 oz. silver and \$11 gold.

Equipment includes 2 small steam hoists and an air compressor at the Arizona property, and a 75-h. p. gasoline hoist, 2 air compressors, machine shop, carpenter shop, smithy and other necessary mine buildings on the Nevada property.

The concentrator, in New York canyon, near Austin, of 100 tons daily capacity, has a 10x16" Blake crusher, two 36x16" rolls, 9 Card tables, 6 slime tables and a small cyanide plant.

MARION MINES & MILLS CO.

COLORADO

Office: 850 Equitable Bldg., Denver, Colo. Mine office: Fairview, Custer Co., Colo. Company refuses information and has not answered letters from this office. Henry E. McElwain, pres.; Frank Bulkley, vice-pres. and gen. mgr.; Jos. Credlartz, sec.-treas.; preceding officers, John S. McElwain, Holyoke, Mass., and Clarence A. Brandenburg, Denver, directors. Capitalization \$300,000, increased from \$200,000, fully paid by \$100,005 cash, balance in property. Outstanding debts, Feb. 24, 1913, \$52,050.

Property, known as the Greenhorn group, 19 claims, includes the Sam Davis claim, 10 acres, patented, 154 acres held by location, 11 acres under lease and bond and 7 acres mill site, a total of 185 acres mineral land in the Hardscrabble district, Custer county, Colo.

Development is by a tunnel showing a vein of zinciferous copper and lead ore with small gold and silver values. Has water power, air compressor and a 100-ton concentrating mill. As the entire copper production of Custer county for 1912 is valued at \$353 and the lead produced at \$463, the output of the mine has not been large.

MARKHAM GULCH MINING & MILLING CO.

UTAH

Office: Salt Lake City, Utah. Mine office: Bingham Canyon, Salt Lake Co., Utah. Walter J. Orem, general manager, at last accounts. Organized Sept. 29, 1906, under laws of Maine. Is controlled by the Mineral Lands Co., through ownership of entire share capital. Company owns no mines but has a 200-ton concentrator, on the site of the old Red Wing mill.

MARQUETTE & ARIZONA MINING CO.

ARIZONA

Idle. Office: Marquette, Mich. Mine office: Bisbee, Cochise Co., Ariz. Emil Marks, pres. and gen. mgr.; Jos. J. Wirtz, sec. Organized Dec. 6, 1902, under laws of Arizona, capitalization \$500,000, shares \$5 par. Lands, 37 claims, 740 acres, overlaid by a heavy conglomerate capping resting on limestone. Mine has a 560' two-compartment shaft, substantially timbered, passing through limestone showing considerable iron, much of it assaying about \$2 gold per ton. There are short north and south drifts, on the 400' level, and 1 short drift on the 145' level. Company dormant for many years.

MARS CONSOLIDATED CO.

ARIZONA

Office: care F. J. Webber, Colorado Springs, Colo. Capitalization not reported. Company is the successor of the Heckley Gold & Copper Mining Co. Lands, 13 claims, in 3 groups, on Copper hill, in the Black Rock dis-

tract, 6 miles northeast of Wickenburg, Maricopa county, Arizona. Property shows 3 veins of 6', 10' and 25' claimed average width, developed by a 268' tunnel, said to carry ore assaying up to 28% copper. Reported to have resumed work early 1913.

MARSHALL & RUSSELL GOLD M., M. & T. CO.

COLORADO

Idle. Office: 347 West Broad St., Columbus, Ohio. Mine office: Empire, Clear Creek Co., Colo. W. A. Miller, pres.; O. N. Marihugh, sec. and gen. mgr., at last accounts. Organized May, 1901, under laws of Colorado, capitalization \$8,000,000, shares \$1 par, nonassessable; issued, \$7,000,000.

Lands reported by company as 120 claims, with a 50-acre mill site. Development is by a 5,300' main tunnel, planned to be driven for 12,000', piercing Miller, Covode and Red Elephant mountains. The tunnel shows veins with auriferous and argentiferous copper ores. Equipment includes water power and 300-ton ore bins.

MARTIN MINE.

CALIFORNIA

Mine near Calzona, San Bernardino Co., Cal. W. A. Martin, owner. Property, only slightly developed, shows high-grade auriferous copper ore.

MARTIN MINING & POWER CO.

COLORADO

Idle. Mine address: Eureka, San Juan Co., Colo. Samuel G. Martin, general manager, at last accounts. Property, the Tom Moore group, formerly held by Tom Moore Consolidated Mining Co., and later by Tom Moore Gold Mining Co., latter organized 1907. Property carries veins showing ores with auriferous and argentiferous sulphides of lead, copper and zinc. Equipment includes a hydro-electric plant and a Leyner air compressor.

MARTINEZ SMELTER.

CALIFORNIA

Owned by Mountain Copper Co., Ltd., at Martinez, Contra Costa Co., Cal.

MARY MINING CO.

MEXICO

Office: 412 Empire Bldg., Pittsburgh, Pa. Mine office: Jesús Maria, Rayón, Chihuahua, Mex. John E. Carnahan, pres.; J. Worth Carnahan, sec.; Todd C. Woodworth, mgr., at last accounts. Capitalization \$12,000,000.

Lands, said to be about 8,000 acres, in the Año Nuevo district, some distance from a railway, including several antigua gold mines, and the Nellie B., Mary and Arichuyvo mines, developed by tunnel showing copper and lead ores, claimed to give average assays of 9.5% copper, with small lead, silver and gold values.

Equipment includes a mill with 20 stamps, completed 1910. Management planned, several years ago, a 100-ton concentrator and a 125-ton smelter, but failed to build either. Idle.

MARY VERA MINING & MILLING CO.

COLORADO

Mine office: Frisco, Summit Co., Colo. H. T. McAllister, general manager, at last accounts. Capitalization \$500,000, shares 10 cts. par. Mine on the west slope of Ten Mile range, developed by tunnel, has auriferous and argentiferous copper and lead ores. Equipment includes a small steam plant and a Leyner air compressor. Idle since 1910.

MASCOT COPPER CO.

ARIZONA

Office: Harris Trust Bldg., Chicago. Mine office: Dos Cabezas, Cochise Co., Ariz. T. N. McCauley, pres.; R. V. Dixon, vice-pres.; J. C. Knapp, sec.; D. S. Stevenson, treas.; C. V. Weston, gen. mgr; preceding officers, Hon Frank K. Mott, J. W. Phillips and H. H. Evans, directors; F. L. Sizer, supt.; B. W. Tibby, cons. engr.

Organized July, 1907, under laws of Arizona, capitalization \$10,000,000, shares \$10 par.

Lands, 47 claims, 700 acres, about 300 acres being classed as mineral

lands, in the Dos Cabezos district, 18 miles from a railroad. Company also owns a town site near Dos Cabezos, and miscellaneous other lands, including 3 placer claims, total holdings aggregating over 1,100 acres.

Property shows limestone near a granitic area, intruded by diorite dikes and quartz porphyry with a covering of rhyolite, on part of the ground. The limestone shows in the lower hills on the south. Granite constitutes the 2 pillars known as Dos Cabezos.

The ore occurs largely in lenses in contact deposits between altered lime and porphyry and generally within a mineralized zone of from 300 to 400' in width. Ores carry chalcopryite in a gangue of contact minerals and carry from 3 to 20% copper, the average being 5% copper, with small gold and silver values.

Development is by the 450' Oregon shaft, and 2 tunnels, longest the 1,800' Consolidated tunnel, connecting with the shaft at the 4th level. Total underground openings aggregate 18,000', and ore in sight is estimated at about 500,000 tons. About 15,000' of diamond drilling has been done in various parts of the property.

Equipment includes a 250-h. p. distillate engine, a 12-drill air compressor, machine shop, electric-lighting plant, smithy, telephone system and boarding houses, with a total of about 80 buildings upon the property. About 80 men are employed.

The mine management is good and property is reliably reported as promising, though the company's advertising was lurid and its campaign of stock selling has been very unfavorably regarded in past years.

MASCOT MINING CO.

ARIZONA

Idle. Office: 1318 Majestic Bldg., Detroit, Mich. Mine office: Willcox, Cochise Co., Ariz. Christian Kern, pres.; Geo. F. Scheffer, vice-pres.; W. C. Rohns, sec.; J. A. Zahn, treas.; Delos D. Jayne, gen. mgr.; C. W. Courtney, supt., at last accounts. Organized March, 1905, under laws of Arizona, capitalization \$1,000,000, shares \$1 par. Company has no connection with the Mascot Copper Co., operating in the same county.

Lands, 35 claims, unpatented, 700 acres, lying about 40 miles northeast of Willcox, in the Clark and Montezuma districts, on the western slope of the Graham mountains, in 4 groups, within 4 miles of each other, show mainly granite with some Carboniferous limestone and frequent intrusive dikes of porphyry and rhyolite. The claims carry veins of 6" to 20' width, showing copper and lead ores, occasionally with high silver and gold values, principally as malachite, azurite, chalcocite, chalcopryite and galena, usually with gangue of quartz, but occasionally of decomposed limonite or hematite.

The Gold Cord group of 11 claims shows a vein of 6" to 22' width, traceable 2,000', opened to depth of 107', with about 1,300' of workings. Ores are highly auriferous copper sulphides, assaying 1 to 3% copper only, with gold values up to \$90 per ton. Equipment at the Gold Cord includes a 30-h. p. boiler, pumps and a hoist.

The Iron Bell group of 9 claims, $3\frac{1}{2}$ miles from the Gold Cord, carries a 3' vein opened by a 100' shaft showing ore assaying 1 to 15% copper and about 1 oz. gold per ton.

The President group of 3 claims, about $1\frac{1}{2}$ miles from the Gold Cord, shows both porphyry and granite, in which there is a fissure vein of 3 to 4' width, having auriferous silver-lead ore, with quartz gangue, developed by a 130' shaft. Ore is said to concentrate 10 into 1.

The Republic group of 2 claims, 2 miles from the Gold Cord, shows a vein of 4 to 22' reported width, having low-grade ore carrying lead, silver and gold.

Buildings include an engine house, smithy, boarding house and bunk house. There is a 2-stamp mill. Second-grade ore, of \$20 estimated average value per ton, is milled to \$140 concentrates, which are shipped, in connection with first-grade ore carrying 7 to 9% copper and up to 2 oz. gold per ton. Company not favorably regarded.

MASCOTA COPPER CO.

MEXICO

Office: 513 Germania Life Bldg., St. Paul, Minn. Mine office: Ameca, Jalisco, Mex. Chris. D. O'Brien, Sr., pres.; J. M. Bowler, vice-pres.; Byron J. Mosier, sec.-treas.; Chris. D. O'Brien, Jr., gen. mgr., at last accounts. Organized June, 1908, under laws of Arizona, as successor of Independence Mining & Smelting Co., capitalization \$1,500,000, shares \$1 par.

Lands, 46 hectares, said to include an antigua mine, are in the Guachinango division of the Mascota district, 24 miles from the Mexican Central line. The claims show an 8' fissure vein in porphyry, said to be traceable about 2,000' and proven to depth of 486'. The ore is reported to average 5% copper, 7 oz. silver and 6 grams gold per ton.

Development includes a 300' shaft and a 375' tunnel, with 4,825' of workings, estimated to show 40,000 tons of ore, with 28,000 tons blocked out for stoping.

Equipment includes a 50-h. p. steam plant, with 3-drill Sullivan air compressor. There are 17 mine buildings. The reduction plant includes a 25-ton wooden stamp mill, with 10 Allis-Chalmers gravity stamps, and a small concentrator, equipped with 2 Overstrom tables, a vanner, 4 slime tables and a sizer.

MASCOTA, S. A.; NEGOCIACIÓN MINERA.

MEXICO

Office: Ap. 840, Mexico, D. F. Mine office: Tequisistlán, Tehuantepec, Oaxaca, Mex. Emilio Maervers, pres.; Max von Duerping, vice-pres.; Francisco Ponce de León, sec.-treas.; Rodolfo W. Batelt, gen. mgr. Organized Nov. 5, 1906, under laws of Mexico, capitalization 300,000 pesos, shares 50 pesos par, divided into 2,000 free and 4,000 assessable shares. Has levied \$40,000 assessments.

Property, 262 hectares, in the San Carlos Yautepec mineral district, shows a 5' vein carrying chalcopryrite and tetrahedrite, said to give average assays of 9.5% copper, 30 oz. silver and \$5 gold per ton. Development is by tunnel 400' long, at last report. Nearest railway is the National Tehuantepec, 50 kilometers distant. Equipment includes a steam plant, and a 4-drill air compressor.

MASON VALLEY EXTENSION MINING CO.

NEVADA

Idle several years. Office: 300 Herald Bldg., Salt Lake City, Utah. Mine address: Mason, Lyon Co., Nev. C. W. Reese, pres.; A. G. Gutheil, vice-pres. and gen. mgr.; R. S. Wimmer, sec.-treas., at last accounts. Organized 1907, under laws of Utah, capitalization \$100,000, shares 10 cts. par, assessable; issued, \$86,700. Annual meeting, second Monday in May.

Lands, 14 claims, patented, 201 acres, showing limestone, porphyry and granite, carrying fissure veins and contact deposits between limestone and porphyry, developed by shafts and tunnels with about 1,000' of workings.

MASON VALLEY MINES CO.

NEVADA

Office: 14 Wall St., New York. Mine office: Thompson, Lyon Co., Nev. W. H. Aldridge, pres.; Frank W. Holmes, vice-pres.; H. F. J. Knobloch, sec.; Henry E. Dodge, treas.; preceding officers, Wm. B. Thompson, John F. Alvord and W. Mont Ferry, directors; Jules Labarthe, gen. mgr.; W. J. Cox, mine supt.; A. J. McNab, smelter supt.; C. A. Bovett, mg. engr.; C. O. Kamm, purch. agt.

Organized Jan. 4, 1907, under laws of Maine, as successor of the Mason

Valley Copper Co., capitalization \$2,500,000, shares \$5 par; increased March 14, 1910, from \$1,000,000, shares \$1 par; issued \$777,750. Bonded debt is \$984,500 in authorized \$1,000,000 first mortgage, 10-year, 6% gold bonds in \$500 bonds convertible previous to April, 1915, into stock on the basis of \$10 per share and redeemable on 31 days notice at 102½ and accrued interest.

The mortgage securing the bond issue contains a sinking fund provision, by which the company is required to pay to the trustee within 60 days after Jan. 1, each year, beginning 1912, 20 cts. for each net dry ton of ore treated during the year preceding, with a provision whereby the sinking fund payments may be reduced proportionately, as outstanding bonds are retired. The directors were authorized by vote of shareholders, March 14, 1910, to issue any part of the treasury stock for acquisition of additional property. Annual report of Dec. 31, 1912, gave cash on hand \$160,841, and total current assets as \$418,540, with current liabilities \$274,514. Net profits for first half of 1913 were \$118,068. Guaranty Trust Co., New York, and United States Trust Co., Boston, registrars. Bankers Trust Co., New York, and Boston Safe Deposit & Trust Co., transfer agents. Shares listed on Boston and Salt Lake stock exchanges.

Property, 7 claims, patented, 140 acres and a fractional claim of 10 acres, known as the Spragg mine, lying south of the Bluestone and about 1½ miles west of Mason. Company also owns a smelter and 1,320-acre smelter site near the railway; also 320 acres of ranch lands. Property shows a strong outcrop with north-south strike, being a contact deposit between limestone and andesite, partly covered by rhyolitic tuffs. The latter rocks are comparatively soft and have been eroded into steep escarpments and sharp gulches. Ore occurs as a contact deposit making big replacement masses in limestone of 30' average width. Surface ore is mainly malachite with a little cuprite, succeeded, at about 100' depth, by cupriferous pyrite, largely massive, with copper in the form of chalcopyrite. The mine is said to have some ore averaging 10% copper but the average tenor is about 3.5% copper. An average analysis shows 16 to 17% iron, 16 to 18% lime, 12% sulphur and 38% silica.

Considerable bluestone was produced from this property for the mines of the Comstock lode, 1870-75, and a record of over 1,000 tons of selected ore shipped from surface pits gives an average of better than 30% copper.

Development is by tunnels and upraises. The workings reach a depth of 550' and cover 1,000' of the strike of the main contact deposit. In addition to the main orebody, known locally as the west vein, there is an apparently independent orebody. The main orebody has been proven for 18 to 120' in width, with an average of probably about 30'. Though the ore as a whole is low-grade, there are occasional high-grade shoots, 1 of which, up to 20' in width carried ore assaying 15 to 65% copper. Sub-levels have been driven at 12 to 15' above the main levels and some winzes have been sunk to depth of 50 to 75'. Drill holes have shown the existence of good sulphide ore to depth of 485' below the mine workings.

No. 1 tunnel is a crosscut driven through garnetiferous limestone and intersecting the vein about 250' from the portal at depth of 100', the vein being about 20' wide, dipping east and carrying chalcopyrite-garnet ore.

The No. 2 tunnel cuts the vein with a back of 200' and shows an orebody of about 35' width, carrying high-grade ore. An intermediate level, between tunnels Nos. 1 and 2, shows the vein to have a total width of 90' at one point with ore up to about 10% in copper tenor.

No. 3 tunnel, of 2,100' length, cuts the vein at depth of about 350', proving 45' of ore for 230' length as an orebody separate and entirely dis-

tinct from the main contact vein. This orebody carries some cuprite and native copper and averaged 5% copper.

No. 4 tunnel, of 2,600' length, is connected with No. 3 by a 140' upraise and cuts a vein of about 25' average width proven by drifts and crosscuts on this level to have an extreme width of about 130'.

No. 5, the bottom tunnel, gives a back of about 600' on the vein and is connected with workings above by an upraise. Work on this level encountered an oxidized zone, quite thoroughly leached of values.

The mine has developed a very considerable tonnage of low-grade carbonate and sulphide ores, with a smaller quantity of high-grade ores. Actual development work was begun March, 1907, and workings aggregated 16,527' on Dec. 31, 1912.

Mining equipment includes 2 electric air compressors, with total capacity for 18 drills, a 50-h. p. motor generator set, and a 7x10" duplex hoist, in the No. 4 tunnel. No large hoists are required, owing to the present plan of development by tunnels.

A 6,250' tramway, with drop of 600', of 100 tons hourly capacity, connects the mine with the Copper Belt railway, which line connects with the company's smelter 16 miles distant.

The smelter, built at a cost of approximately \$600,000, and blown in Jan. 6, 1912, is about 2½ miles from Wabuska, on the Southern Pacific railway and about 16 miles from the mine. The plant consists of a sampling mill for custom ores, extensive storage bins for ore, coke and fluxes, a blast-furnace building, with two 44x300" blast furnaces, of 1,000 tons daily capacity, a sintering plant, power house, machine shop, plate shop, smithy and carpenter shop. The blast furnace has a 200' brick chimney with inside diameter of 16'. Two stands of 12' converters, of the Great Falls type, are to be installed.

The smelter treated from 580 to 630 tons of ore daily in the autumn of 1913, much of it silicious ore with precious-metal contents. The smelter has been in operation 18 months and produced 25,000,000 lbs. of copper, of which 8,625,000 lbs. were produced in the first half of 1913, compared with 8,224,000 lbs. for the same period in 1912.

The company does considerable custom smelting and received and smelted 146,530 tons of ore from Goldfield and over 150 shippers in 29 different mining districts in Nevada and California during 1912. The output of its own mines totalled 98,912 tons and the production of fine copper, 1912, was 16,058,496 lbs. and about 18,000,000 lbs. in 1913.

Mine considered promising, though rather small for so large a company, but management is good and smelter bound to receive a big custom business, as the prospects of the region are developed. At present the smelter earnings are small, owing to the failure of the mining companies to supply the ore contracted for.

MASONIC MOUNTAIN GOLD MINING CO.

CALIFORNIA

Office: Carson City, Nev. Mine near Masonic, Mono Co., Cal. F. E. Garrett, pres.; Wm. H. Paul, sec.-treas., at last accounts. Organized Jan. 25, 1906, under laws of Nevada, capitalization \$1,250,000, shares \$1 par.

Lands, 7 claims, unpatented, in the Masonic district, Mono county, Cal., 70 miles from a railway. The claims show fissure veins in granite and porphyry, reported to range 3 to 30' in width and to be traceable 1,500'. The veins have oxidized ores and occasional native copper, giving assays of 1 to 18% copper and \$4 to \$30 gold per ton. Development is by shafts of 187', 50' and 100', and tunnels of 600' and 50', with about 1,500' of workings, showing considerable ore. Equipment includes a 25-h. p. gasoline hoist. Presumably idle.

MASS CONSOLIDATED MINING CO.

MICHIGAN

Office: 79 Milk St., Boston, Mass. Mine office: Mass, Ontonagon Co., Mich. John W. Linnell, pres.; Theo. O. Nicholson, vice-pres.; Wilfred A. Bancroft, sec.-treas.; Elton W. Walker, supt.; preceding officers, Francis L. Maguire, Wm. F. Fitzgerald, Jas. B. Hill, D. Allison Carrick and Fred J. Schultheis, directors; F. W. Sperr, cons. engr.; E. Fenner Douglass, mill supt.; Wm. J. Ninness, mg. capt.; Jos. Bice, master mechanic.

Organized 1899, under laws of Michigan, capitalization \$2,500,000, shares \$25 par; issued, 97,317 shares; paid in \$23; \$8 paid on organization, balance in 10 installments; last assessment \$2, levied May, 1911. Report for year 1912 shows \$348,070 received for copper and \$335,673 spent on mining development and other expenses, with cash balance for year of \$13,681, or total surplus of \$30,710. Assets are valued at \$142,031 and liabilities, etc., at \$132,684.

Company was mining 350 to 400 tons a day, carrying between 18 and 20 lbs. of refined copper per ton when closed down by the labor strike in July, 1913.

Lands, about 5,500 acres, lying in a very irregular but fairly compact tract, in Secs. 33, 34 and 35, T. 51 N., R. 38 W., in Secs. 4, 5, 6, 7, 8, 9 and 16, T. 50 N., R. 38 W., and in Sec. 1, T. 50 N., R. 39 W., holdings being bounded on the north by the Union, Adventure and farm lands, on the east by the Adventure and Toltec, on the south by the Flint Steel and the Knowlton mine of the Adventure, and on the west by the Flint Steel, Adventure and St. Mary's Mineral Land Co. Holdings include 4 old mines, the Ridge, Evergreen, Mass and Ogima, also 2 old prospects, the Merrimac and Hazard, joint production of which, under previous managements, was 11,131,023 lbs. fine copper. The Ridge mine, operated 1850-74, made 5,134,449 lbs. copper and paid dividends of \$100,000. The old Mass mine, opened 1856 and worked intermittently until 1886, secured a total output of 5,014,266 lbs. copper, and the Ogima, opened 1860 and closed 1868, made 982,308 lbs. copper. The Merrimac and Hazard were early-day explorations without recorded production. These 5 properties are described, in detail, in Vol. II.

The Mass tract carries 6 of the 7 cupriferous amygdaloidal beds of the Evergreen belt, these varying greatly in width from point to point but averaging about 10', with a sharp bend in their strike, which varies from N. 32° E., on the north, to N. 37° E. at the southern boundary. The dip of the beds varies from 38° at the Ridge to 47° at the old Mass mine. The copper-bearing beds of the Evergreen belt on the lands of the Mass Consolidated are as follows, from north to south:

1. Knowlton. Carries heavy copper and stamp rock.
2. Mass. Lies 140' south of the Knowlton, and carries a little heavy copper and stamp rock.
3. North Butler. Lies about 75' south of the Mass bed, is wide and fairly mineralized in places.
4. Butler. Lies about 200' south of the North Butler, is 12' to 35' wide, carrying mainly stamp copper with occasional masses.
5. Ogima. Lies about 100' south of the Butler. Carries mainly stamp copper with some barrel-work, being 5 to 10' wide and showing some good ground.
6. Evergreen or Ridge. Lies about 250' south of the Ogima and is 1 of the best beds of the property, ranging 4 to 40' in width and usually being richest where widest. Is very bunched but shows some excellent stipes yielding heavy copper and stamp-rock of good grade.
7. New Mass. This bed which is the lowest of the series of the Ever-

green belt and brings the number of cupriferous beds to 7, corresponding with the number in the adjoining Adventure property, lies about 120' under the Evergreen bed and was opened by crosscuts from "A" shaft on the 15th and 18th levels. The bed averages about 12' in width carrying considerable epidote and is very showy, but the copper is exceedingly fine, most of it being of a flaky nature, very deceptive to the eye. A mill test of the rock from this bed, 1909, gave a recovery of only 18 lbs. of mineral per ton.

Development work in 1912 was confined to the Butler and Evergreen lodes.

The Mass has openings on all of its copper-bearing beds, and rock is hoisted through the nearest shaft, all workings on each level being connected by crosscuts. The Mass carries the outcrop of the copper-bearing beds of the Evergreen belt for about 1½ miles. Shafts "A" and "B" are connected on the Butler lode down to and including the 10th level. The mine as a whole is notably rich in mass copper and carries silver values, but the ground is exceedingly bunchy, ranging from very rich to absolutely barren. Considerable rock selection is made underground and culls used for filling. Under the new management a system of rock assorting was put into operation, 1910, resulting in bringing the average contents of stamp rock to about 16 lbs. per ton. It is possible, in the case of this and many other mines similarly situated having large bodies of bunchy ore, to secure a low tonnage cost at the price of very low average extraction, or to secure high copper returns at the price of unduly high working costs per ton. About 50% of the rock broken is being selected and about 25% of the recovery is now in mass copper. The mine was working 25 drills, Dec., 1912, and a single mass of copper weighing 16,900 lbs. was secured May, 1910.

"A" shaft, 1,757' deep, with 2 compartments, formerly known as the Ridge No. 3 shaft, is sunk on the Evergreen bed and connected with the Butler bed by crosscuts on several levels. The Evergreen bed in this shaft runs 8 to 10' in width, showing considerable rock of good grade. This shaft has been abandoned.

"B" shaft, 875' southwest of "A," has 3 compartments, and is bottomed at 1,857'. Levels are at variable intervals, the old workings having 60' levels, while some of the newer levels, at the bottom of the mine, are 135' apart. Levels at considerable intervals permit a large saving in drifting through poor ground and sub-levels can be run where needed. The major portion of the workings have been opened on the Evergreen, but the Butler bed has been reached by crosscuts, on different levels, and shows some good stopes, while the North Butler supplies some fair stamp and barrel copper. The Knowlton bed has been opened also, by a crosscut on the 7th level, showing some good stamp rock and considerable heavy copper. The chief production comes, however, from the Evergreen, a strong amygdaloidal bed with plainly-defined walls and a dip of 43°, having some good stopes of 20 to 25' width. The Evergreen, in this shaft, while exceedingly bunchy, carrying occasional stretches of almost barren ground, has developed some large stopes that were both wide and rich.

In 1912 development work at this shaft was west on the 600' and 800' levels, where the Evergreen lode showed an increased width of milling ore.

"C" shaft, 2,148' southwest of "B," with collar 100' higher, was bottomed on the 13th level, at the beginning of 1913. This is the old Ogima shaft, cut down, retimbered and deepened, and is sunk on the Butler bed, which makes a fair copper showing. The Evergreen bed tributary to "C" shaft is opened by a 400' crosscut on the 5th level. Some high-grade ground was opened in the 3rd, 5th, 7th and 9th levels west on the Butler bed during 1912. The company has centered work upon the Butler openings, though

some work was done also on the Ogima and Knowlton beds, tributary to "C" shaft, in 1910, results on the whole being promising.

"D" shaft, 1,800' southwest of "C," was sunk only 150' and has been idle for some years.

There are a number of old shafts, the 450' main shaft of the old Mass mine proper having 7 levels opened on the Knowlton bed. This was pumped out, 1901, and the showing pronounced satisfactory. The Ogima bed has been opened at several points by crosscuts from "A" and "B" shafts and was found bunchy though showing occasional good stopes.

Considerable diamond drilling has been done, largely in 1909, south from the Evergreen bed into the horizon traversed by the so-called Adventure lodes, cut by diamond drills on the Adventure property, and also north of the Knowlton bed. Diamond drilling was done, 1910, in the N. E. $\frac{1}{4}$ of Sec. 5, to test amygdaloidal and conglomerate strata outcropping at that point, which is quite a distance under the hypothetical horizon of the so-called Adventure lodes, with distance to the eastern sandstone undetermined.

The shaft rock house at "B" is equipped with a steam hammer, Blake crusher and a 12x24" Nordberg engine. "C" shaft has a new steel shaft rock house. Both rock houses have been equipped with devices permitting automatic handling of rock.

The central power house, 48x150', has a 24x48" Allis-Chalmers duplex hoist with 10' 6" drums having 11' faces, grooved for $1\frac{1}{2}$ " cable, good for one-half mile depth. The power plant includes a 50-drill Rand 2-stage cross-compound air compressor, a 75-kw. dynamo for electric light, and two 250-h. p. Stirling water-tube boilers.

In addition to the usual mine buildings, there are about 60 good dwellings. The company also has a town site, Mass City, which is the terminus of the Mineral Range railroad, and a station on the C. M. & St. P. railway, the village having a considerable population, with a number of hotels and business houses.

The Mass mill is at Keweenaw bay, on an arm of Lake Superior, at the junction on the Mineral Range and Duluth, South Shore & Atlantic railways, 16 miles south of Houghton and 34 miles northeast of the mine, with ample sand room, deep water, and immunity from heavy seas. The 90x232' mill, built by the Wisconsin Bridge & Iron Co., is of steel frame on stone foundations. Equipment includes 2 Nordberg stamps, having vertical mortar grates supplied with automatic hydraulic cleaning devices. Each head has a nominal stamping capacity of about 525 tons daily, increased to 700 tons daily by the addition of rolls.

The 30x60' mill boiler house contains one 350-h. p. and two 200-h. p. Stirling water-tube boilers. Ashes and cinders are washed into the lake through a launder.

The 40x70' pump house has a 16,000,000-gal. Nordberg vertical pump, fed from a 12x30' well, with bottom 6' 6" below mean water level, connected with a tunnel running 300' under the bed of the bay to the intake.

A 1,000' wharf, serving also as a breakwater, has 18' of clear water at its end, and is equipped with 3 towers and derricks, capable of unloading coal vessels at the rate of 900 tons daily. Coal is taken from the wharf, in 3-ton cars, by a 14x20" hoist, to a 1,500' storage trestle of 20,000 tons capacity.

In his report the consulting engineer, F. W. Sperr, recommends doubling the rate of production, estimating that the production cost per pound of copper would then be: mining, 4.534 cts.; surface expense, 1.384 cts.; general expense, 0.074 cts.; taxes and insurance, 0.19 cts.; freight, 1.15 cts.;

stamp-milling, 1.61 cts.; development, 1 ct.; a total of 9.934 cts. per pound. The development work during the year was highly satisfactory, 352,100 tons having been added to the reserves, making the net total, Dec. 31, 1912, 727,000 tons.

Production was begun 1899, with an output of 42,800 lbs. fine copper, gradually increased to the high-water mark of 2,576,447 lbs. in 1903, decreasing thereafter, through loss of the Evergreen bed. Recent production has been as follows: 2,007,950 lbs. fine copper in 1905; 2,106,677 lbs. in 1906; 2,078,677 lbs. in 1907; 1,766,930 lbs. in 1908; 1,723,436 lbs. in 1909; 1,321,885 lbs. in 1910; 1,326,898 lbs. in 1911; 2,045,006 lbs. in 1912.

The Mass Consolidated has had to cope with almost every sort of misfortune that befalls mines, but, through the acquisition of the Evergreen Bluff property, has been placed in better mining position than ever before and the experience of 14 years has given a very thorough knowledge of the vagaries and possibilities of the 7 cupriferous beds of the Evergreen belt. All of these are somewhat buncchy, but 2 of the number are of real promise, these being the Evergreen and Butler. It is probable that several of the 5 other beds can be worked occasionally, owing to their contiguity to the 2 beds named, but the future of the mine rests upon results to be secured from the Evergreen and Butler beds. Given extensive openings, which the mine never has had, permitting a large production, combined with judicious selection of rock, such as is now being made, the Mass has very fair prospects of making a payable, though not a rich mine. There also is the possibility of locating and developing other and richer beds to the southward of the main workings, in the horizon of the Lake and Adventure beds. The management is thoroughly progressive and experienced.

MASSACHUSETTS CONSOLIDATED COPPER CO. CALIFORNIA

N. E. Guyot, superintendent, Red Bluff, Tehama Co., Cal. Property, the Tom Head mine, shows a deposit of copper ore developed by shaft. Equipped with steam power.

MASSEY STATION MINING CO., LTD.

ONTARIO

Office: 57 Home Life Bldg., Toronto, Ont. Mine near Massey, Ont. Wallace Nesbitt, pres.; S. H. P. Pell, vice-pres.; Britton Osler, sec.; preceding officers, Robt. Means Thompson and Miss I. M. Innes, directors. Organized April 24, 1901, under laws of Ontario, capitalization \$300,000, shares \$100 par, nonassessable; fully issued. Company is said to have expended about \$300,000 on development and equipment.

Property, 840 acres, crown granted, including 480 acres timber land, in Salter township, Sudbury district, about 3 miles from a railway. Lands show schist and quartzite carrying lenticular orebodies in east-west zones with 75° dip. There are 3 parallel lenses, 2 developed averaging 10' in width in an ore zone traceable about a mile. Ore carries finely disseminated chalcocite and gray copper ores in quartzose gangue changing in depth to bornite and that in turn to chalcopyrite, estimated by management to average 3 to 5% copper and \$1 to \$2 gold per ton, with about 50,000 tons in sight.

Development is by a 600' shaft with levels at 100' intervals, opened for lengths of 50 to 150'. There is also a 150' tunnel about a mile from the main shaft.

Equipment includes a 200-h. p. steam and electric plant, with 6x8" and 10x12" Lidgerwood hoists, and a 6-drill Ingersoll-Rand air compressor. There are 15 buildings, including shops, warehouse and office.

The ore not being adapted to wet concentration, owing to excessive sliming, a 50-ton experimental mill has been built, using the Elmore vacuum oil flotation process, with Blake and centrifugal crushers and 3 Jenckes and

Wilfley tables. Property closed down in 1909 owing to failure of mill to make expenses.

MATEHUALA SMELTER.

MEXICO

Owned by American Smelting & Refining Co., at Matchuala, S. L. P., Mex.

MAVERICK COPPER CO.

ARIZONA

Mine office: Florence, Pinal Co., Ariz. Geo. Lobb and Eugene Woodbury, managers. Property, known as the Iron Spring mine. Claims show a strong outcrop, carrying finely disseminated chalcocite, with some oxides, carbonates and a little native copper, estimated to average 3% copper. Development is by a shallow shaft and a number of prospect pits and shafts. Annual assessment work only has been done since 1910, when the Copper Queen Co. relinquished its \$100,000 bond on the group.

MAY COPPER CO.

ARIZONA

Mine address: Goddards, via Bumble Bee P. O., Yavapai Co., Ariz. Property in Tip Top district at mouth of Black Canyon creek, 50 miles north of Phoenix. Claims show a copper deposit near the Harris Copper Co.'s holdings. Developing by a 100' shaft in 1913.

MAY MINING CO.

ARIZONA

Idle. Office: Sidney, Ohio. Mine office: Mayer, Yavapai Co., Ariz. M. L. Heffelman, pres. and gen. mgr.; J. D. Barnes, sec.-treas., at last accounts. Organized 1902, under laws of Arizona, capitalization \$200,000, shares \$1 par, nonassessable. Bonds, \$50,000 authorized, partly issued.

Property, the May and Malcolm claims, 40 acres, patented, 3 miles south of Mayer, in the Big Bug district. Lands show a 13' fissure vein in schist and a bedded deposit between sericitic and quartz schists of 150' estimated width, carrying sulphide ore, estimated by company to average 3% copper. Development is by shafts of 237' and 205', equipment including a 50-h. p. steam hoist, with 3 buildings.

MAYER CONSOLIDATED MINING CO.

ARIZONA

Mine office: Mayer, Yavapai Co., Ariz. E. F. Miller, sec.-treas.; Louis D. Hall, gen. mgr., at last accounts. Organized 1910, as successor of Pittsburg-Mayer Mining Co. Lands, 5 claims, 3½ miles east of Mayer, in the Big Bug district, show fissure veins in schist carrying auriferous copper ore, developed by a vertical shaft of 175' depth. Equipment includes gasoline power. Presumably idle.

MAYER MINING & MILLING CO.

ARIZONA

Office: Mayer, Yavapai Co., Ariz. John Malm, superintendent. Organized June 1, 1910, as successor of Rigby Mining & Reduction Co. Company owns a custom smelter, on a 70-acre site, near Mayer, connected with the Prescott & Eastern railway by a 3,000' spur. The smelter, planned to operate on the Poehle & Croasland volatilization process, was fully described Vol. VIII, under title of Rigby Mining & Reduction Co. Several smelter tests were made and pronounced satisfactory, but neither this company nor its predecessor has done any commercial smelting. Idle several years and presumably out of business.

MAYFLOWER MINING CO.

MICHIGAN

Office: 705 Sears Bldg., Boston, Mass. Mine office: Houghton, Houghton Co., Mich. Chas. J. Paine, Jr., pres.; Harry F. Fay, Geo. E. Clarkson, A. L. Dickerman, F. W. Nichols and Geo. P. Gardner, directors; Arthur E. Coe, sec.-treas.; Geo. S. Goodale, supt. Organized 1899, under laws of Michigan, capitalization \$2,500,000, shares \$25 par; \$9 paid. St. Mary's Mineral Land Co. owns 25,000 shares of the capital stock. Company had \$58,259.67 cash on hand, Jan. 1, 1913. Expenses were \$41,966.22 in 1912. Annual meeting, third Wednesday in March.

Property, 840 acres in the heart of the copper range, between the Kearsarge and Old Colony mines and east of the South Kearsarge and Wolverine mines. Lands comprise Secs. 7 and 8, T. 56 N., R. 32 W. Prospecting, begun in 1899, was continued 5 years. No. 1, or Fault shaft, 400' deep, has considerable drifting on the 1st and 2nd levels and a crosscut opens 2 parallel cupriferous amygdaloids, showing occasional patches of copper, but nothing of promise.

No. 2, or Isle Royale shaft, 160' deep, has several hundred feet of drifting and shows a buncchy amygdaloid, 10 to 12' wide, carrying more or less copper in a 2' streak next to the hanging wall.

No. 3, or Sandstone shaft, is 60' deep, in a soft and badly broken amygdaloid, all of the strata near the eastern sandstone being much disturbed.

No. 4 shaft, 580' deep, starts from surface on an unnamed amygdaloid, lying approximately 2,000' east of the Kearsarge bed and at a depth of 425' runs into a parallel amygdaloid lying 90' to the eastward of the first bed. The copper showing is poor.

A fairly complete geological cross-section was obtained by diamond-drill borings and exploratory work was resumed July, 1909, after 3 years' idleness. Up to date, 33 holes have been put down which, together with the holes on the Old Colony tract, prove up a big and well mineralized amygdaloid bed, called the Mayflower lode, for a distance of 2,000' and a depth of 1,500'. The lode lies on the extreme eastern side of the copper range, near the Eastern sandstone.

Thirteen holes on the Mayflower and 10 on the Old Colony ground showed commercial ore; hole No. 20 showed 101' of 1.65% rock; hole No. 22, nearby, showed 100' of 1.2% copper ore, 60' of which carried 1.9%; holes Nos. 16 and 17, in this locality, showed 87' and 95' widths. A new shaft is to be started 500' west of hole No. 20, near the Old Colony boundary line.

MAYO MINING CO.

MEXICO

Idle. Mine near Jesús Maria, Chihuahua, Mex. John E. Carnahan, mgr.; Carlos Smythe, supt., at last accounts. Capitalization \$1,000,000. Is a twin of the Mary Mining Co. Lands, said to be 3 mines, carrying argentiferous and auriferous copper ore. Shut down several years, but taxes said to be paid.

MAZAPIL COPPER CO., LTD.

MEXICO

Office: 47 Peter St., Manchester, England. Mine address: Aptdo. 64, Saltillo, Coahuila, Mex. Percy E. O. Carr, gen. mgr.; Alfred Crewdson, chairman; Wm. Andrew Aitchison, John Seacome Burrows, W. A. R. Heaven, Jacob Higson, Chas. Hopkinson, Wm. Jones and Jas. Wm. Purcell, directors; W. Hickie, gen. mine supt.; C. R. H. Blythe, engr. Organized Feb. 18, 1891, and reorganized April 21, 1896, under laws of Great Britain, capitalization increased, 1903, to £300,000, shares £10 par, and again increased, 1912, to £500,000, shares £1 par; issued, £422,490. Debentures, £120,000, at 6%. Has paid several dividends: 20% in 1910; 20% and a 5% bonus in 1911; 10% (interim) Sept. 28, 1912; also a bonus of 5 shares of stock for every £10 original share.

Accounts for 1911 show a net profit of £110,294 with £28,504 surplus from previous year, making total of £138,798. Dividends absorbed £70,145, mines purchase, £2,465, and directors fees, £1,500, leaving a balance of £64,419. Reserve fund, £196,660. The company is a private concern and does not care to give details concerning its mining operations. Company owns and operates the Coahuila and Zacatecas railway, running from Saltillo to Concepción del Oro, 2 smelters and various mines, employing be-

tween 3,000 and 4,000 men. Operations were suspended June, 1913, by the Mexican revolution.

Property, about 2,000 hectares of mineral land in 4 principal groups. The Aranzazú and Cabrestante mines, carrying copper ores, are the most important; the San Elijo, Naranja, Cajón, San Francisco and Protrero mines, carrying silver-lead ores, and the Promontorio group, producing mainly fluxing ores, with some ore of 25 to 45% copper tenor, with good gold values. There also are other groups, known as the Salaverna and San Pedro mines. Copper ores occur in irregular masses, in limestone, near granite-porphry contacts.

The various mines of the company have 83 different shafts and tunnels, many of which are small and worthless, remaining from old operations, with upwards of 25 miles of workings. The Aranzazú mine is developed by a 1,600-meter tunnel, starting from Concepción del Oro and tapping the vein at depth of 500 meters, 200 meters below the old workings, serving the triple purpose of developing new ore reserves, draining the mines, and furnishing water needed for the mill.

The smelters are at Concepción del Oro and Saltillo. The first named, of about 500 tons daily capacity, has 4 copper furnaces. The Saltillo smelter, built 1906, has a lead plant of 300 tons daily capacity and does a general custom business, as well as treating ores of the company. There are 4 blast furnaces, 1 reverberatory furnace and a converter department with 4 stands. Equipment includes electric power, with a. c. generators direct-connected to 2 Harrison-Fleming Corliss tandem-compound condensing air compressors.

Transportation is by 4 aerial trams, 1 connecting the Aranzazú mine with the smelter, being of 7 kilometers length with 23 metric tons hourly capacity, built by Ropeways, Ltd. The San Pedro group ships silver-lead ore by rail.

The concentrator, at the mines, is of 150 tons rated daily capacity, but the district is arid and operations have been hampered frequently by shortage of water, though the water supply has been supplemented by the driving of the Aranzazú tunnel. A Minerals Separation plant to treat the complex lead, zinc, silver, pyrite ore was installed in 1912.

The Ferrocarril Coahuila y Zacatecas has 75 miles of main line. Production, 1912, was 13,556,208 lbs. copper, 15,024,485 lbs. lead, 8,463,536 lbs. zinc, 1,572,012 oz. silver and 15,560 oz. gold.

MAZATAN COPPER & GOLD MINING CO.

MEXICO

Office: 60 State St., Boston, Mass. Mine office: La Colorada, Sonora, Mex. R. C. Jacobs, sec.; Dudley M. Bell, gen. mgr. Capitalization \$2,000,000, shares \$5 par. Title to property is held through the Mazatan Mining Co., S. A.

Lands, 100 hectares, 246 acres, 17 miles west of Soyopa, on the west side of the Yaqui river valley and western slope of Rodríguez mountain, district of Hermosillo. The property shows 4 distinct veins in granite, surface ores being mainly azurite and malachite with occasional masses of chalcocite occurring in seams and kidneys in the vein matter. Orebodies vary from 3 to 12' in width. Values are mainly in gold and are said to average \$4 to \$5 per ton.

Development is by 4 shallow shafts, 3 tunnels and numerous open cuts, all openings with one exception, being in the oxidized zone.

The property was fully reported on by S. H. Parsons, E. M., Jan. 1911.

MAZATZAL COPPER CO.

ARIZONA

Idle. Office: Jerome, Ariz. Jos. J. Shaw, pres. and gen. mgr.; E. A.

Macpherson, sec.-treas., at last accounts. Organized Jan. 6, 1907, under laws of Arizona, capitalization \$1,500,000, shares \$5 par.

Lands, 24 claims, 420 acres, and a 5-acre mill site, about 12 miles east of Fossil creek, and 9 miles from Payson, in the Tonto basin, in a district very difficult of access, about midway between Jerome and the Roosevelt dam, and 80 miles northwest of Globe, from which point the property is best reached, at present.

The property shows a shear zone of about 35' average width, said to be traceable 3,000' by outcrops carrying copper carbonates and occasional sulphides. This ore zone has a porphyry footwall and slate hanging, carrying a series of lenses with cuprite, azurite and malachite, succeeded by sulphide copper ores, with a small stringer of argentiferous galena. Development is by a 40' shaft and 3 tunnels, each over 400' long, said to show a 22' pay-streak of sulphide ore, assaying 16 to 21% copper. Ores as a whole have been estimated to average 5.5% copper, 3% lead, 2 oz. silver and 40 cts. gold per ton.

Equipment includes a 50-h. p. steam plant with a double-drum hoist and a 2-drill Ingersoll air compressor. There are 5 buildings. Property considered promising but too remote to be worked profitably at present.

McCaffrey Mining & Smelting Co.

MONTANA

Office: Basin, Jefferson Co., Mont. Roger and Frank McCaffrey, Basin, Mont.; J. B. McCaffrey, Jos. K. Mueller, F. B. McGreevey, T. F. Stall and J. T. Twomey, of Chicago, directors. Organized Jan., 1913, under laws of Montana, capitalization \$500,000, presumably to take over the Basin Reduction Works, sold for debt, but formerly owned by the La France Copper Co. and operated until 1912 under lease by the Butte & Superior Copper Co.

McConnell Mines Co.

NEVADA

Office: Yerington, Nev. Mine office: Mason, Lyon Co., Nev. O. H. Sonne, pres.; S. B. Elbert, sec. and mg. engr.; preceding, Mrs. O. H. Sonne and Mrs. S. B. Elbert, directors. Organized Sept. 14, 1912, capitalization \$500,000, shares \$5 par; issued, 40,002 shares.

Property, 10 claims, partly fractional, 160 acres, patented, adjoining the Yerington Malachite mine on the west. Claims show limestone, shale and granite with argentiferous contact deposits in the contact zone near the granodiorite. Property has 4 orebodies, the 2 under development averaging 25' in width and carrying about 3.5% copper.

Development is by a 400' shaft and 3 tunnels of 330', 300' and 325'. Recent work on the 200 level of shaft opens up 4' of 3 to 12% sulphide ore.

Equipment includes a 25-h. p. hoist, 7-drill air compressor, and 8 buildings. Company has been shipping 50 tons daily throughout 1913.

Production, 1912, was 1,074,289 lbs. fine copper, secured from 16,284 tons of ore smelted and at a total cost of about 14 cts. per pound. Property regarded as good and management capable.

McCoy Creek Mines Co.

WASHINGTON

Office: Chehalis, Wash. Mine office: Vance, Lewis Co., Wash. C. L. Sticklin, trustee, at last accounts.

Lands, 26 claims, on McCoy creek, in 2 groups, 12 miles south of Vance, are developed by several tunnels, showing high-grade copper ore, with small gold and silver values.

Equipment includes a small saw mill and a stamp mill. Presumably idle.

McDonald-Ely Copper Co.

NEVADA

Office: Boyd Park Bldg., Salt Lake City, Utah. Mine address: J. P. Turner, supt., Ely, White Pine Co., Nev. D. C. McDonald, pres. and gen. mgr.; Col. Enos A. Wall, vice-pres.; Geo. W. Parks, sec.; Frank Knox,

treas.; preceding officers, Frank J. Westcott, Geo. W. Lamb and Hon. Thos. Kearns, directors; E. P. Jennings, cons. engr. and mgr. Organized Nov., 1906, under laws of Utah, capitalization \$1,000,000, shares \$5 par, nonassessable; issued, \$790,000. Debentures, \$100,000, at 6%, maturing Nov. 15, 1915. Shares are listed on the Salt Lake Stock Exchange.

Lands, 28 claims, patented, 325 acres, with a ranch nearby that has a good spring. Apparently 19 claims are held under bond lease. Property, on the lime belt, in the northeastern part of the Ely district, carries 4 contact deposits, between porphyry and limestone, showing prominent iron outcrops. Management estimates veins as 20' wide carrying oxidized ores, the sulphide zone not having been reached, assaying 1 to 40% copper, and about 80 cts. gold per ton. Development is by the 250' Mill shaft; 405' Golden Gate shaft, caved 1912, but reopened 1913; 165' Robust shaft; 80' No. 2 shaft; 65' No. 3 shaft; 80' No. 4 shaft, and the 415' Wall tunnel, showing 21' of heavy iron. A 218' crosscut in the Robust shaft shows copper ore of fair grade. The mine as a whole has about 3,000' of workings.

Development work was resumed in 1913 on the 320' level of the Golden Gate shaft, drifting on the Robust vein to get beneath the gossan showing on the Maceo claim. A 70' winze proved ore said to assay 13 to 40% copper as bornite, chalcopyrite and glance carrying up to \$2.20 in gold and silver.

Equipment includes a 25-h. p. gasoline hoist, 40-h. p. steam hoist, and a 6-drill Ingersoll-Sergeant air compressor. There are 6 buildings, including necessary shops. A pumping plant and pipe line supply water from a spring at the ranch.

An old 50-ton mill, with rolls and cyanide plant, remains from a former ownership. The 100-ton concentrator has a gyratory crusher and 3 trains of rolls. Property considered promising and management good.

McGILL SMELTER.

NEVADA

Owned by Steptoe Valley Mining & Smelting Co. at McGill, White Pine Co., Nev.

McKINLEY MINES, LTD.

BRITISH COLUMBIA

Office: Rossland, B. C. Mine near Franklin, Boundary district, B. C. B. Lequime, pres.; H. W. Warrington, vice-pres.; A. M. McKenzie, sec.; C. L. Hammond, managing director. Property, 4 claims, on the North fork of Kettle river, about 34 miles north of Grand Forks and 18 miles from the Kettle Valley railway terminus. The claims were under bond and lease to the British Columbia Copper Co., 1912, and a long tunnel driven. James Breen, of Spokane, owns 75% of the stock. The company was promoted by P. A. O'Farrell, who spent \$30,000 supplied by F. A. Heinze, in diamond drilling, before Heinze abandoned the proposition and it was taken up by Mr. Breen.

McKINLEY MINING CO.

UTAH

Office and mine: Eureka, Juab Co., Utah. W. D. Myers, president. Mine, west of the Centennial-Eureka, is developed to depth of 500', and an east-west dike of 35' estimated width on the 500' level is said to show ore worth about \$6 per ton. The stock is assessable and the company has had some difficulty in obtaining funds to carry on its development campaign.

McKINLEY MINING CO.

WASHINGTON

Office: 1723 Cincinnati St., Spokane, Wash. Mine at Orient, Ferry Co., Wash. H. M. Gibson, pres.; A. O. Stuber, vice-pres.; T. Larsen, treas.; W. Hausken, sec.; preceding officers and J. D. Grimes, directors. Organized 1909, capitalization \$1,000,000, shares \$1 par.

Property, 9 claims, with 5 contiguous claims owned by the company's officials, lies on the eastern side of McKinley mountain at 2,850' elevation

and 4 miles northeast of Rock Cut. Claims show 3 north-west veins with gold-copper ores.

Development on No. 1, a gold-silver vein, includes a 143' shaft, with 42' crosscut not yet in vein, and a 53' shaft with 40' drifting on vein. A 570' tunnel is intended to cut this vein at 640' and 300' below the surface. No. 2 vein of copper ore is 6' wide and is developed by 4 prospect shafts, a 37' tunnel and a 100' incline. The third vein, 18 to 30' wide, is opened by a 75' shaft.

McKINLEY MINING & DEVELOPMENT CO.

ARIZONA

Office: Prescott, Ariz. Chas. E. McKinley, pres. and gen. mgr. Organized 1906, under laws of Arizona, capitalization \$1,000,000, shares \$1 par.

Lands, 38 claims, 760 acres, are in the Copper Basin district, 11 miles south of Prescott. The Dixie group of 6 claims has veins of 5 to 15' width, carrying auriferous and argentiferous copper ore. The Peacock group has a vein of 60' claimed width, carrying surface ores said to average 3.7% copper, with good gold values, developed by the Peacock shaft, planned to be sunk to 700', showing sulphide ore giving assays up to 15% copper, 5 oz. silver and \$6 gold per ton.

Equipment, according to company's report, includes steam, electric, water, gasoline and air power, with 2 hoists, 1 good for 1,000' depth. No returns securable, 1913.

McKITTRICK MINE.

ARIZONA

Property, a group of claims adjoining the Tejon mining and Leonard copper properties at Gleeson, Cochise Co., Ariz., in the Turquoise, or Courtland district. Claims show limestones intruded by porphyry dikes and carrying replacement deposits of oxidized copper ores with limonite in limestone. Development by extensive tunnels. Idle in 1912, but work resumed in 1913.

McMAHON GROUP.

ARIZONA

Office: Zonia, via Kirkland, Yavapai Co., Ariz. Property, the Zonia mine and a group of claims, south of Zonia, shows irregular bedded veins in micaceous schists, carrying small and bunched shoots of high-grade oxidized ore. Small shipments of 5 to 6% ore were made in 1912. The property was under option to the Mines Development Co. (Shannon Copper Co. interests) in 1911, but churn-drill results were unsatisfactory and option was relinquished. See Mines Development Co.

McMILLEN-STONEWALL MINING CO.

ARIZONA

Office and mine: Globe, Gila Co., Ariz. V. Y. Smith, pres. and gen. mgr.; C. N. Lightle, sec.-treas. Organized March 27, 1907, under laws of Arizona, capitalization \$1,000,000, shares \$1 par.

Lands, 34 claims, in the Richmond basin, 16 miles northeast of Globe, carrying 3 miles of the strike of the Stonewall Jackson vein, of 25 to 35' average width. Property includes the Stonewall Jackson mine, worked 1876-83, with an estimated production of about \$500,000 of silver ore, of high average grade. Development is by the 300' three-compartment McMillen shaft and the old 600' Stonewall Jackson shaft, latter showing no stoping done below 230'. The mine is said to have considerable reserves of ore carrying 5 to 50 oz. silver per ton, and is said to have about 40,000 tons of discarded silver ore on the old dumps on which cyanide tests were made, 1910. Equipment includes an old stamp mill and a small cyanide plant. A full and favorable report on the property was made, May, 1912, by R. B. Wagner.

MEADOW CREEK COPPER & MOLYBDENITE CO. WASHINGTON

Idle. Letter unclaimed at Bellingham, Wash. Mine office: Keller, Ferry Co., Wash. J. E. Jennot, manager, at last accounts. Lands, on

Meadow creek, about 5 miles northwest of Keller, show 4 veins, 1 claimed to be 45' wide. Tunnels on the vein are said to show fair mineralization with copper, lead, molybdenum, silver and gold, ore estimated to average \$20 per ton in gross values.

MEADOW MINING CO. MICHIGAN

Idle. Office: 62 Devonshire St., Boston, Mass. Mine near Copper Falls, Keweenaw Co., Mich. Francis L. Maguire, pres.; John Brooks, sec-treas. Organized 1898, under laws of Michigan, capitalization \$1,500,000, shares \$25 par. Is a reorganization of a corporation of same name organized 1863, under special Michigan charter. Lands, 364 acres, adjoining the Humboldt and Phoenix mines, carrying the Ashbed lode, which was first opened 1851, with a little mining previous to 1860. Where the Ashbed is crossed by transverse fissures, bunches of ore occur and such places usually show pits of prehistoric miners. Fully described Vol. II.

MEDICINE BOW'S MINES CO. WYOMING

Office and mine: Albany, Albany Co., Wyo. Jas. Christensen, pres.; G. S. Simmons, vice-pres. and supt.; Wm. Benton, sec-treas. and gen. mgr. Organized Sept. 19, 1903, under laws of Wyoming, capitalization \$100,000, shares \$10 par.

Lands, 10 claims, unpatented, 200 acres, in the Holmes district. Claims are said to show syenite, granite, diorite and limestone, with fissure veins in syenite and granite, and deposits between gabbro and serpentine. The Cuprite vein, formerly under development, is of 15' average width, traceable a mile, carrying chalcocite, bornite and chalcopyrite ore, estimated by company to average 5% copper, 3 oz. silver and \$4 gold per ton. Test shipments have returned 7 to 15% copper, 2 to 12 oz. silver and \$3 to \$18 gold per ton. Development is by 10 pits and shafts of 10 to 80' depth, and a 960' tunnel. The company estimated, 1911, 40,000 tons of ore in sight, with 16,000 tons blocked out for stoping. Company appears to have kept up assessment work and was still in existence in 1912.

MEDORA MINE. MICHIGAN

Owner by Keweenaw Copper Co., at Mandan, Keweenaw Co., Mich.

MELCHER MINING & MILLING CO. IDAHO

Office: 409 Hooper Blk., Salt Lake City, Utah. Mine office: Albion, Cassia Co., Idaho. Samuel McIntyre, Sr., pres., gen. mgr. and treas.; R. M. Wilkinson, sec. and purch. agt.; P. McIntyre, supt. Organized under laws of Utah, capitalization \$1,000,000, shares \$2 par; issued, 410,000 shares.

Property, 37 claims including former holdings of the Cumora Mining Co., bought 1912, is in the Stokes district, 38 miles from a railroad. Country rock is schist, granite and quartzite, orebodies occurring as fissure veins in both schist and granite. The vein developed runs N. 10° E. and dips 68° west.

Development is by the Cumora and Melchor shafts of 210' and 75' and the 650' Cumora, 850' Giant and 3,290' Melcher tunnels, showing a 3' vein of chalcopyrite and galena and lead carbonates said to average about 1% copper, 10% lead, 5 oz. silver and \$5 gold per ton.

Equipment includes 200-h. p. steam and water power plant, 5-drill air compressor and 6 small buildings.

Company now developing vein in Giant tunnel and driving the Melcher crosscut tunnel to crosscut the 3 veins.

MELCZER MINING CO. MEXICO

Is the operating company of the Copete Consolidated Copper Co., which see.

MEMPHIS & IDAHO SPRINGS GOLD M. & M. CO. COLORADO

Idle. Mine near Idaho Springs, Clear Creek Co., Colo. J. J. Williams, pres.; Wm. M. Slack, sec.-treas., at last accounts. Organized under laws of Colorado, capitalization \$1,500,000, shares \$1 par, nonassessable. Lands, 14 claims, patented, carry auriferous and argentiferous lead, copper and zinc sulphides. Mine is developed by shafts of 125', 250' and 460' and is tapped at depth of 2,350' by the Newhouse tunnel. Equipment includes a 22-h. p. electric hoist and an air compressor.

MEMPHIS MINING CO. NEW MEXICO

Mine office: Organ, Dona Ana Co., N. M. C. E. Head, pres.; J. I. McCullough, sec.-treas.; J. F. McCullough, gen. mgr. Organized 1911, capitalization \$1,000,000.

Property is the old Torpedo, or Memphis copper mine. Development is by 2 shafts and a 400' tunnel, showing an 8' vein with a 3' paystreak, said to carry argentiferous copper ore worth up to \$60 per ton in combined values. Idle in 1912, but expected to operate this winter.

MEMPHREMAGOG MINING CO. QUEBEC

Office: Sherbrooke, Quebec. Mine office: Bolton Center, Brome Co., Quebec. Geo. E. Smith, pres. and mgr. Organized under laws of Quebec, capitalization \$50,000, shares \$100 par. Owns the Smith mine with 150 acres, freehold, near Lake Memphremagog. Lands show a lenticular deposit between schist and a diabase dike of 50' estimated average width, traceable 1,000', carrying complex sulphide ore estimated, by the management to average 3% copper, 2% lead, 2% zinc, 1 to 4 oz. silver and \$1 to \$9 gold per ton. Developing only in 1912.

MENDHA-NEVADA MINING CO. NEVADA

Office: Commercial Bldg., Salt Lake City, Utah. Mine office: Pioche, Lincoln Co., Nev. T. J. Osborne, pres.; M. C. Godbe, sec., at last accounts. Capitalization \$1,000,000, shares \$1 par. Property, the Melessa mine, is said to have produced \$500,000 under its former ownership. The mine is reported to have a vein 3 to 15' thick averaging 6', practically vertical and showing on the 700', or bottom level, silver and gold-bearing lead and copper ores assaying up to \$100 per ton. Net smelter shipments have given returns of about \$30 per ton. Development is by a 900' incline shaft.

MERCER-SAN RAFAEL MINING CO. MEXICO

Office: Mercer, Pa. Mine near Tapalpa, Jalisco, Mex. J. W. Tyrrell, pres.; J. M. Thorne, sec.; Jas. M. Young, gen. mgr.; Geo. J. Graham, supt., at last accounts. Organized 1906, under laws of New York, capitalization \$3,000,000, shares \$1 par.

Lands, 112 hectares, known as the San Rafael group, on the eastern slope of the Sierra Cacomá, in a very rugged district, about 20 miles west of Ayutla. The property is an ancient mine whose workings show a wide belt of quartzite and diorite cut by veins carrying auriferous and argentiferous chalcopryrite ores with occasional lead and zinc sulphides occurring in shoots up to 40' in width. The mine has about 12,000' of workings.

Equipment includes a hydraulic power installation. The 50-ton concentrator has 5 stamps, a Samson crusher, Elspass mill, Pierce amalgamator and 3 Bartlett tables, with a small cyanide plant and patio. Idle on account of revolution.

MERRIMAC MINING CO. ARIZONA

Address: Globe, Gila Co., Ariz. Guy M. Smith, supt. Property, 22 claims at Powers gulch, developed by 150' tunnel and 65' shaft, with 350' of workings, showing 15' of black sulphide ore reported to carry 9% copper, \$4 gold and 80 oz. silver per ton.

MESCAL MINING CO.**ARIZONA**

Mine office: Jerome, Yavapai Co., Ariz. Capt. Samuel B. Adams, pres. and gen. mgr.; J. Prather, sec., at last accounts. Organized under laws of Arizona, capitalization \$1,500,000, shares \$1 par.

Property, the Mescal copper mine, 7 claims, 3 patented, known as the Owen & Allison group, near Mescal gulch, on Mingus mountain. Claims show fissure veins in slate and contact deposits between slate and diorite. The vein worked is of 3' average width, traceable 1,600' and opened by an 85' shaft and tunnels of 220' and 900', with a blind shaft from the 700' tunnel level. The mine had about 1,200' of workings at last accounts showing chalcoppyrite assaying 1 to 2% copper, with a trace of gold.

Equipment includes electric power and an air compressor, and there are 5 buildings. Idle for some time but operations resumed 1913, when shaft was unwatered, retimbered and machinery installed.

METAL DE COBRE; COMPANIA MINERA.**MEXICO**

Mine near San Antonio de la Huerta, Ures, Sonora, Mex. Organized under laws of Mexico, and is the holding company of the Rio Yaqui Copper Co.

METALINE ORIOLE MINING CO.**WASHINGTON**

Office: 223 Mohawk Blk., Spokane, Wash. Mine office: Metaline, Pend Oreille Co., Wash. Fred. N. Davis, pres. and gen. mgr.; E. E. Doan, vice-pres.; Thos. R. L. Harris, sec.; H. F. Snamiska, treas.; Joseph Lancaster, mg. engr. Organized Dec. 30, 1910, under laws of Washington, capitalization \$1,500,000, shares \$1 par, assessable. Total calls to end of 1912, \$30,000.

Lands, 5 claims, 100 acres, and a 5-acre mill site, unpatented. Property has 2 fissure veins in quartzite, the one under development showing a width of 6 to 8', and carrying about 1% copper, 12% lead, 25% zinc, 40 to 80 oz. silver and \$5 gold per ton. Development is by a 200' shaft and 3 tunnels of 50', 400' and 750'. A 100' shaft sunk at 60° on the vein from the lower tunnel shows ore throughout a 70' drift. Company has 1,500 tons of ore on the dump. Equipment includes steam power, with small hoist and 3-drill air compressor. Company was planning, 1913, to erect a 50-ton mill.

METALLURGICAL CO. OF AMERICA.**UNITED STATES**

Office: 52 Broadway, New York. Richard Merton, pres. and gen. mgr.; J. Langeloth, vice-pres.; Theo Sternfeld, treas.; preceding officers, B. Hochschild, Edward Balbach, Jr., and Otto Sussman, directors; Julius Goldman, sec. Organized May 19, 1904, under laws of New Jersey, capitalization \$2,000,000, shares \$100 par; 15,000 shares issued for the purpose of exploiting mining and smelting enterprises. Annual meeting second Tuesday in April, at Jersey City, N. J.

METHOW GOLD & COPPER MINING CO.**WASHINGTON**

Mine office: Winthrop, Okanogan Co., Wash. W. D. Scott, pres.; J. N. Tewinkel, sec.-treas. Organized 1889, under laws of Washington, capitalization \$90,000, shares 5 cts. par. Lands, 8 claims, 150 acres, show fissure veins in Algonkian rocks. The sulphide ores assay 9% copper, 2 oz. silver and \$5.50 gold per ton. Development includes 3 tunnels, longest 564', and a 52' shaft. Has available water power and timber. Idle except for annual assessment work.

MEXICAN-AMERICAN SMELTING & REFINING CO.**MEXICO**

Owns the Guaymas smelter. The smelting plant is at Batuecas, a suburb of Guaymas, Sonora, Mex., on tide water, lying between the Bay of Guaymas and the S. P. R. R. of Mexico. The smelter was originally erected by William C. Greene, founder of the Greene-Cananea Copper

Co. and not having been operated for some years, will need extensive alterations. Guaymas is well located for a large smelting plant and company has a 250-acre site in a splendid situation for operating.

This smelting company also owns a smelter concession from the Government covering the mining districts of Hermosillo and Guaymas, in the state of Sonora, for a period of 20 years. This concession is one of the most valuable ever granted in Mexico, by reason of its privileges and exemptions.

MEXICAN EXPLORATION & MINING CO.

MEXICO

Is controlled by the Pacific Smelting & Mining Co., through ownership of practically entire share capital. Described Vol. X.

MEXICAN METALS CO.

MEXICO

Office: 35 Congress St., Boston, Mass. Mine office: Cananea, Sonora, Mex. Geo. E. Keith, pres.; Geo. H. Woodman, vice-pres.; Sumner M. Teele, sec.; Harold C. Keith, treas.; other directors: William Brocken and Eldon B. Keith; August Fritsche, gen. mgr.; Henry Beckman, mine supt.; J. W. Baker, mill supt.; S. B. McCluskey, metallurgical and mg. engr.; Chas. Ahnell, purch. agt.; Albert M. Jackson, chemist-assayer.

Organized August 16, under laws of Arizona, capitalization \$5,000,000, shares \$5 par, assessable; \$2.25 paid. Company succeeded the Arizpe Mines Co. and operates and holds title to property through the Moctezuma-Arizpe Development Co., legalized in Mexico. Old Colony Trust Co., registrar; Federal Trust Co., transfer agent. Annual meeting, second Monday in September. Shares are listed on the Boston curb. An assessment of 15 cts. per share was levied September, 1913. Operations, 1912-13, have been much hampered by chronic warfare about the mine, causing a small deficit in operations.

Property, a compact tract of 6,500 acres in several groups, also a one-half acre mill site, in the Manzanal mountain range, about 15 miles south-east of Cananea.

Lands show porphyry and diabase, the orebodies occurring in shear zones of brecciated diabase, silicified and cemented with sulphides, having a generally N.-S. strike and dipping about 75°. There are 5 ore bodies under development, ranging in width from 3 to 40'. Ores are mainly tetrahedrite, bornite and chalcopyrite, high-grade ore carrying up to 5% copper, 20% lead, 200 oz. silver and \$1 gold per ton, and milling ores averaging 1% copper, 12 oz. silver and about \$1 gold per ton.

The principal mines are the Alacran and Palo Seco, former having a main working shaft 300' deep and a 150' prospect shaft. The Palo Seco shaft is 400' deep and there is also a 150' shaft and a tunnel. There are a number of prospects on the property, the most important being the Manhattan with 4 shafts 100 to 200' deep and 2 tunnels of 400' and 600', the Rey de Cobre having a 250' shaft, the Victoria 75' shaft and the Sevilla tunnel of 250'. Total length of underground openings is about 6,000'. Ore reserves are estimated at 50,000 tons. The Manhattan property, 4,000 acres, shows surface indications markedly similar to those noted on the Greene-Cananea property and is to be developed by churn drilling.

Equipment includes a small steam plant, 2 Bessemer 165-h. p. oil engines, 4 hoists, 2 with capacity good for depth of 800', and a 1,400-cu. ft. air compressor. The concentrator will treat 110 tons daily making \$54 concentrates. Mill has a 7x10" Blake crusher, a Hartz jig, 5 Wilfley tables, 2 Deister slime tables, 4 Callow tanks, hydraulic classifier and canvas tables. Buildings are an office structure and 2 warehouses in Cananea, a 20x40' machine shop, a 14x20' smithy, store building, office, laboratory, boarding house, 3 cottages and 35 miners' dwellings at the mines.

Transportation facilities consist of a 5-ton Pierce-Arrow motor truck, and a Ford touring car.

Production is small but the company's holdings include some properties of promise and are being systematically and intelligently developed under the able supervision of Mr. Fritsche. A preliminary report on the property was made, 1908, for the Arizpe Mining Co., by Arthur Houle, E. M.

MEXICAN MINES CORPORATION.

MEXICO

Letters unclaimed at Lincoln Trust Co. Bldg., Jersey City, N. J. Mine near Baca, Hidalgo, Chihuahua, Mex. C. L. Graves, sec.; E. J. Ernest, gen. mgr., at last accounts. Organized under laws of Maine, capitalization \$3,500,000, and is protocolized in Mexico. Lands are 5 groups, including former holdings of the Janie Mining Co. The Ventura mine, about one-half mile from the Mina Cigarrero, has a 230' three-compartment shaft, showing fissure veins carrying streaks of auriferous and argentiferous copper ore below commercial tenor. A little commercial ore is said to have been developed. Equipment includes a machinery plant. Presumably idle.

MEXICAN MINES-PROSPECTS DEV. CO., S. A.

MEXICO

Office: Cinco de Mayo 32, Mexico, D. F. Mine office: Hostotipaquillo, Jalisco, Mex. J. L. Requena, pres.; Percy A. Babb, gen. mgr. Organized 1907, under laws of Mexico, and is said to hold a controlling interest in the Compania Esplotadora de Jalisco.

Lands include the San Luis del Oro and Juanquiniquilla mines. The San Luis del Oro mine, 82 hectares, carries mainly silver and gold values having some rich ore. The Juanquiniquilla mine, 131 hectares, 31 miles southwest of San Marcos, has auriferous copper ore. The property is said to include a porphyry ore deposit. Presumably idle.

MEXICAN MINING CO.

MEXICO

Idle. Office: Long Beach, Cal. Mine office: Alamos, Sonora, Mex. C. C. Clute, pres.; J. B. Randall, vice-pres.; J. T. Newell, sec.-treas.; Wm. Hitchcock, mgr., at last accounts. Organized under laws of California, capitalization \$300,000. Lands, 10 hectares, known as the Veta Grande mine, developed by shafts, said to show a considerable body of copper ore and company claims to have 50,000 tons of low to medium-grade ore on the dump. Equipment includes steam power.

MEXICAN SMELTER CO.

MEXICO

Office: Pedricena, Durango, Mex. Property is a 50-ton furnace, built on the patents of Jas. E. Anderson, to use petroleum for fuel, which did not prove successful. Idle several years.

MEXICAN SMELTING CORPORATION, LTD.

MEXICO

Office: 671 Salisbury House, London, E. C., England. Works office: Monclova, Coahuila, Mex. A. F. Roberts, secretary. Organized Aug. 29, 1908, under laws of Great Britain, capitalization £150,000, in 100,000 ordinary shares of £1 par and 1,000,000 shares of 1s. par. All ordinary and 169,200 1s. shares issued. Bonds £200,000 first-mortgage profit-sharing debentures at 6½% authorized; £15,600 issued. Lands about 3,000 acres. No returns securable. Company was organized to acquire for £55,000 a tract of 3,000 acres of land at Tapada, near Monclova, Coahuila, Mex., and to erect a smelter and do a general custom smelting business.

MEXICAN SMELTING & REFINING CO.

MEXICO

Idle. Works office: Taxco, Alarcon, Guerrero, Mex. Lawrence Tatum, pres. and gen. mgr.; Fredk. M. Perkins, supt., at last accounts. Lands, 200 hectares, including several antiguas, principal being the San Jose mine, carrying copper ores with values mainly in silver. Has gas power and a 60-ton smelter with water-jacket blast furnace and a small refining furnace.

MEXICANA; COMPANIA METALURGICA.**MEXICO**

Office: 82 Beaver St., New York. Mine offices: Sierra Mojada, Coahuila, Mex., and Concepcion del Oro, Zacatecas, Mex. Works office: San Luis Potosi, S. L. P., Mex. Robt. S. Towne, pres. and gen. mgr.; R. E. Safford, sec.; Geo. H. Carnahan, gen. mine supt.

Organized 1890, under laws of New Jersey, capitalization \$4,000,000, shares \$100 par, fully issued, in \$1,000,000 cumulative 8% preferred stock, \$1,250,000 guaranteed 6% second preferred stock, and \$1,750,000 common stock. Debentures, \$3,000,000 first-mortgage 5% bonds authorized, due July 31, 1931, with a 2% annual sinking fund, bonds being subject to call at 110 and accrued interest; issued, \$2,265,700. Company is not a dividend payer. Morton Trust Co., New York, registrar. Annual meeting, first Monday in June.

The company's interests are extensive, including control of numerous subsidiary mining, transportation and land companies, among the more important being the Sombrerete Mining Co. and the Mexican Lead Co., at Sombrerete, Zacatecas, Mex., the Montezuma Lead Co., Alvarez Lead & Timber Co., Mexican Mineral Railway Co., and Potosi & Rio Verde Railway Co.

The Veta Rica mine, at Sierra Mojada, produces silver-lead and copper ores, latter averaging 3% copper, 5% zinc and 20 oz. silver per ton. Development is by a 600' main shaft and values are mainly in lead and silver.

The Cerro Prieto and adjoining mines, at Concepcion del Oro, developed by tunnels, contain veins producing gold copper ores. The San Pedro and San Pablo mines also are important producers.

The Minas Flojonales, in the state of Hidalgo, carrying veins with auriferous and argentiferous lead and copper ores, are under development. The company is said also to have property in the vicinity of Taxco, in the state of Guerrero, Mex.

The smelter, treating about 750 tons daily, has a modern equipment, including 12 furnaces for the reduction of gold, silver and lead ores, and a special copper department of 100 tons daily capacity. The works have steam and electric power, and employ about 1,000 men. The company is a large producer of lead and silver, with considerable outputs of copper and gold, secured mainly as byproducts, and is active and enterprising in the rejuvenation of old properties and the development of new mines.

MEXICANA MINING CO.**MEXICO**

Address: W. H. Childs, general manager, Shamokin, Pa. Company is the operating subsidiary of the Keystone Mining Co., formerly the Keystone Copper Smelter Co., of Philadelphia, Pa. Operating office: Aptdo. 22, Guadalajara, Jalisco, Mex. Mine at Tapalpa, Jalisco, Mex. Property, the Keystone mine, has silver and gold-bearing copper ore developed by shaft. Equipment includes steam power and an air compressor. The reduction plant includes a 40-ton mill and 50-ton smelter. Property resumed operations January, 1912.

MEXICO GRANDE MINING CO.**MEXICO**

Address: Chas. L. Montague, treas., Cananea, Sonora, Mex. W. A. Johnson, pres.; Pete Lepash, vice-pres.; R. P. Safford, sec.; M. Bernstein, commissario. Incorporated in Mexico, capitalization 10,000 pesos.

Property consists of the Mexico Grande, Morena, Aldasora and General Lafayette claims, lying north of the main working shaft of the Calumet-Sonora Mining Co. These claims contain the continuation of the vein worked by that company and while no large orebody has been found the slight development on the property has shown good ore. The property shows pale-colored, well-bedded volcanic tuffs and breccias cut by fissure

veins, but has no large outcrop such as characterized other parts of the foothill ore belt of Cananea.

MEXICO MINE.**MEXICO**

See Mina Mexico Co.

MEXICO MINING, REFINING & EXPLORATION CO. MEXICO

Office: 501 I. W. Hellman Bldg., Los Angeles, Cal. Letters unclaimed at Hermosillo, Sonora, Mex. Wm. T. Calderwood, pres. and gen. mgr.; Dr. Chas. B. Nichols, vice-pres.; F. C. Lamb, sec.-treas.; preceding officers, E. B. Lovie, C. A. Neil, L. A. Davis and A. A. Snodgrass, directors; B. A. Ogden, supt.; A. Wainwright, engr. Organized 1905, under laws of Arizona, capitalization \$5,000,000, shares \$1 par, nonassessable. Annual meeting, second Monday in April, at Nogales, Ariz.

Lands, 104 hectares, 260 acres. El Creston de Cobre mine, 100 hectares, about 35 miles west of Hermosillo, shows dolomite and granite and is an antiqua dating from the eighteenth century. The property carries 4 orebodies, of which 2, under development, reported by the company as of 30' average width, and traceable 1,400', carry copper ores averaging 4% copper, 8 oz. silver and \$1 gold per ton. Development is by 8 shafts, deepest 300', and tunnels of 400', 250' and 80' with 1,000' of workings, estimated by the company to show 100,000 tons of ore.

La Cobriza mine, at Soyopa, 4 hectares, is said to show a 16' vein with a 7' paystreak carrying ore formerly claimed to be of 10 to 20% copper tenor, with silver values.

Equipment includes a 235-h. p. steam plant, with 2 hoists and a 6-drill air compressor, and there are 9 buildings. There is also a 20-ton mill. Company employs 15 men, and was planning, 1913, to erect a 100-ton smelter.

MIAMI ARIZONA DEVELOPMENT CO.**ARIZONA**

Mine office: Globe, Gila Co., Ariz. W. L. Lincoln, manager. Property, 13 claims, adjoining the Gibson Copper Co. on the southwest, is developed by about 1,500' of tunnel, showing chalcopryite ore of good milling grade.

MIAMI COPPER CO.**ARIZONA**

Office: 42 Broadway, New York. Mine office: Miami, Gila Co., Ariz. Adolph Lewisohn, pres.; J. Parke Channing, vice-pres.; Sam A. Lewisohn, treas.; preceding officers, Hermann Sielcken, Jacob Langeloth, Wm. H. Nichols, Walter T. Rosen, F. W. Estabrook, Ralph C. Lupton, Theo. L. Herrmann and Julius A. Lewisohn, directors; Herman Cook, sec.; B. Britton Gottsberger, gen. mgr.; F. W. MacLennan, asst. mgr.; I. W. Solomon, mill supt.; W. F. Williams, chief clerk; Arthur Stonham, auditor.

Organized Nov. 30, 1907, under laws of Delaware, capitalization \$3,000,000, shares \$5 par, increased Nov., 1909, to \$3,500,000, and again increased Aug., 1910, to \$4,000,000; issued, \$3,727,705. Of the last increase in capitalization, 60,000 shares were offered to stockholders at \$18 per share. Of the issued stock, 300,000 shares were given, Nov., 1907, in payment for lands; 200,000 shares were issued April, 1908, at \$5 per share; 100,000 shares were issued Aug., 1908, at \$10 per share; 60,000 shares were issued Aug., 1910, at \$18 per share, and of the balance, 88,236 shares were set

MIAMI COPPER CO.

We have been active dealers in this stock since it was brought out.

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aside for conversion of bonds, and 51,764 shares remain unissued. Debentures, \$1,500,000 first-mortgage 10-year 6% gold bonds, convertible into stock at \$17, and redeemable at the option of the company, on any semi-annual interest date, on or before Jan. 1, 1915, at 105, plus accrued interest, upon 4 months prior published notice and after Jan. 1, 1915, upon like notice, at par and accrued interest. Of the bond issue, \$25,000 was outstanding Sept., 1913. The company is controlled, through stock ownership, by the General Development Co. Mechanics & Metals National Bank, New York, and Old Colony Trust Co., Boston, registrars; Bankers Trust Co., New York, and American Trust Co., Boston, transfer agents. Shares are listed on the New York and Boston Stock Exchanges. Annual meeting, third Wednesday in April. Dividend payments were begun May 15, 1912, at the rate of 50 cts. per share quarterly, and to end of 1913 totalled \$2,591,678. Net profits for 1912 were \$2,094,804.

Property, 222 acres, mining claims, patented, 555 acres held for the mill and power plant and 345 acres for water rights, all in the Red Springs or Miami district, 6 to 8 miles west of Globe. Claims show an area of silicified schist at and near a contact with a great intrusive body of granite, known as Schultze granite. The altered schist belt averages about 1,200' in width and has a generally E.-W. direction. The granite merges into granite porphyry at its borders, and this and offshoots, or dikes of the granite in the schist, are mineralized along the ore belt. This is seen in a dike with E.-W. strike, of 40 to 60' width, mineralized in the same manner as the schist.

The schistose area is netted with contraction fractures and later fissuring due to metasomatic changes of volume, accompanying mineralization and alteration. The ore belt is marked by silicification and intense alteration of the schist, a change that fades out into natural gray schist a few hundred yards north of the Miami and Inspiration mines. The ore zone is oxidized and leached to an average depth of 210', this part containing small seams and veinlets of oxidized ore. Below this leached belt a few feet of mixed ore is succeeded by the zone of disseminated glance, a rather soft, much altered rock specked with tiny glance grains and films.

Development of the mine has been by extensive underground operations, supplemented after the mine was opened up, by churn drilling. Up to the end of 1912 drill holes of 600' average depth had been drilled to the number of 62. Drill holes were put down at the corners of 200' squares and practically all of them cut ore, carrying from 110 to 210' in thickness and ranging from 2 to 2.5% in copper tenor. Drill borings in the vicinity of the mine have shown commercial ore to at least 115' additional depth below the 720' level of the mine.

The mine is worked by a very large main shaft with 3 others sunk during prospecting operations and development. The latter are known as the Captain, Red Springs and Red Rock shafts. The Red Rock shaft with 3 compartments was 720' deep at the end of 1912 and is sunk in about the center of the mineral deposit. The Red Springs shaft, 2,150 north-west of the Red Rock, has 3 compartments and is 422' in depth, sunk through surface capping into ore. The Captain shaft, the first shaft put down on the property, was stopped at 210', but in 1913 was deepened to 420' and a tramming level prepared for stoping and ore extraction; 1,894' completed Nov., 1913.

The Miami, or main working shaft, equipped for ultimate production of 5,000 tons of ore daily, is sunk outside the proven mineral zone in order to be immune from caving and is bottomed in granite at depth of 720', the first 450' being through conglomerate. It is 12x16' inside of timbers with

15x19' outside dimensions and framed with Louisiana long-leaf yellow pine, preserved by the use of 12 lbs. of creosote per cubic foot. The timber was creosoted after framing by the International Creosoting & Construction Co. of Galveston, Texas, at a charge of \$20 per 1,000', board measure. The shaft has 5 compartments, two 5x6' hoisting compartments, a 6x12' cage compartment, a 3x6' ladder compartment, and a 3x6' pipe compartment. No. 4 has a 110' steel headgear, with sheave journals 90' above the collar of the shaft, and has 1,000-ton steel ore bins.

As the mine has a solid orebody, the upper levels are opened in the ore zone at only 50' intervals. The first level is at 220' below the collar of the Red Rock, or development shaft, and levels are opened mainly thereafter at 50' intervals, with sub-levels between each, giving ore developed in slices of only 25' vertical depth. Ore is blocked out horizontally by 5x7' drifts, with centers spaced 100' apart, while on the upper levels there are drifts with centers spaced at 50' intervals, blocking out ore in cubes of various sizes, but with all dimensions that are multiples of 25'. Eleven levels have been opened. The 420' and 570' levels handle the bulk of the ore and have 1,000-ton loading pockets. Ore is hauled in trains of twenty 2½-ton ore cars by 6½-ton electric locomotives.

There being practically no waste in the mine, within the limits of the ore zone, the most serious problem was to devise a method by which the greatest amount of ore could be extracted with the least waste. The system used is an adaptation by N. O. Lawton of the auxiliary raise and sub-level stoping method, by which about 60% of the ore will be mined in rooms and the remainder extracted by top-slicing and sub-level caving methods. This gives minimum timbering and the compactness and uniformity of the orebody make it well adapted to this plan of extraction.

At the end of 1912 the company had developed, or explored, 58 acres of the ground classed as mineral-bearing, and of this area 15 acres carried copper sulphides formerly considered too low in grade to be termed ore. It was conservatively estimated by the management that the 43 acres of proven ground carried 20,800,000 tons of ore, averaging 2.48% copper. Besides the amount stated, the property also has about 17,000,000 tons of 1.25% ore which will eventually be worked at a profit. These figures are reliable, because of the unusually thorough manner in which the ore has been developed and blocked out underground and the well known conservatism of the management. A very large part of this ore is actually blocked out underground, and the estimated average percentage is based upon thousands of careful assays, made of samples taken at 5' intervals, throughout the workings. There remain 164 acres of mineral ground yet to be tested, of which a large aggregate area should have ore. New underground openings, 1912, were 54,929', and the mine had 166,252' of workings at the end of the year; It is probable that further development of the mine will develop more or less additional ore, possibly above what is considered the present payable limits, probably below, and almost certainly in the lateral extensions.

The 70x264' power house is on the flat below the mine and reached by side-tracks from the main line of the Gila Valley, Globe & Northern railway. Power generates compressed air at 90 lbs. initial pressure, and a 25-cycle alternating current at 6,600 volts. There are three 4-cylinder triple-expansion engines taking steam at 185 lbs. pressure, with 100' superheat, direct-connected to three 1,000-kw. 3-phase 25-cycle generators. There are two 4-cylinder triple-expansion air compressors with capacity of 4,000 cu. ft. of air per minute, at 90 lbs. initial pressure. Electric current is used for the mill, shops, pumps and underground traction, and com-

pressed air will be used for power drills and hoists. A transmission line has been built to the Roosevelt dam, 70 miles from Miami, and power will be supplied by the U. S. Government from the plant at that point.

The boiler house has four 600-h. p. Edgmore water-tube boilers, generating steam at 200 lbs. pressure, equipped with Green fuel economizers and Foster superheaters, burning petroleum, and a 500,000-gal. storage tank is to be built for oil storage. The boiler plant is so designed that if coal can be obtained later and used with economy automatic stokers can be installed. The boiler house has a reinforced concrete chimney built by the Weber-Duller Co. of Los Angeles, 200' high with tapering walls, having an outside diameter of 23' 4" and inside diameter of 18' 4" at the base and 12' internal diameter at the top, lined for one-third of the height with a 22" course of firebrick covered with 18" of concrete at the base, and reinforced by 2 sets of steel rods on the inside.

The plant at the main shaft, one-half mile from the central power station, consists of 2 Nordberg hoists, the larger for raising ore having 2 drums of 10' diameter with 55" face, capable of handling 1,000' of 1 $\frac{3}{8}$ " rope. An auxiliary hoist has 16x16" cylinders with a drum of 8' diameter and 6' face for hoisting the man cage. Both hoists are operated by compressed air, reheated. The ore hoist raises two 7 $\frac{1}{2}$ -ton skips which are dumped directly into the pockets of the crusher building. No. 4 shaft is planned and equipped to handle 2,000 tons of ore in 8 hours, giving a maximum productive capacity of 6,000 tons per diem.

The crusher building, at No. 4 shaft, of 6,000 tons daily capacity, has Chalmers-Williams crushers, breaking ore to 1 $\frac{1}{4}$ " size, the product being fed through two 4x10' trommels to four 62x18" rolls that crush oversize to half-inch cubes. Ore then goes by belt conveyor, Miami type, heavy duty Traylor, to the mill bins. The stock pile at No. 4 shaft contained 108,213 tons of ore at the end of 1912.

The concentrator was planned and built by H. Kenyon Burch, the builder of the Nacozari and Morenci mills, and like all his work is a complete success. The plant is located on a hillside, south of the ore deposit, permitting the use of gravity in handling material and with a large acreage in the valley nearby, available for many millions of tons of tailings, besides a gulch in front of the mill which provides dumping ground for a number of years to come and also will serve as a reservoir for clarifying the mill water for re-use. The 3,000-ton mill is of steel and stands on a foundation of about 15,000 cu. yds. of concrete. Ore is delivered from the crusher house, at the main shaft, by 300' belt conveyors leading to six 1,000-ton ore bins, 1 at the head of each section of the mill. At the head of each of the 6 sections is a 1,000-ton steel cylindrical ore bin of 30' diameter and 30' height, set 24' above the ground on concrete foundations, each bin having automatic weighing and sampling devices. The sections being similar, a description of one answers for all save the sixth unit.

From the bin ore goes by conveyor to a set of rolls, reducing pulp to $\frac{3}{8}$ " size, after which it is classified by 22-mesh screens, oversize going to Hardinge conical mills replacing the Chilean mills used at first, mill having 30-mesh. The product, with the undersize from the 22-mesh screens, goes to classifiers, the coarse product from which goes to sand concentrating tables and the finer material to slime tables, there being 22 sand tables and 30 Deister tables to each section. One section of the mill has Burch fine crushing rolls in place of Chilean mills. Concentrates go through a tunnel having 6 concrete settling tanks, in which they are dried by vacuum pumps and then taken by belt conveyors to storage tanks above the railway. Concentrates leave one side of the mill, and tailings the other.

In Oct., 1913, the company decided to alter the first 5 units to conform to the sixth unit because the latter secures a 2 lb. per ton better extraction. A 20-ton experimental plant has also been installed to treat mixed sulphide and oxide ores by a new process consisting of: (a) coarse crushing and removal of fine dust; (b) rough water concentration to take out coarse sulphide matter; (c) roasting of tailings from above; (d) leaching with sulphuric acid solution; (e) precipitation of copper by electrolysis and regeneration of solution with sulphurous acid gas, solution then being used again for leaching.

The first unit of the mill started March, 1911, and the sixth and last in Feb., 1913. As a result of several years of continued painstaking experimental work, the mill is fully meeting the predictions made by Mr. Channing. Early experiments indicated a concentration of 15 into 1, but later work showed that as good a recovery could be secured with the higher ratio of concentration of 20 into 1, and the mill is running on this basis, yielding a 40% copper product, with an extraction in the neighborhood of 70% of the assay value. Concentrates are shipped under a 10-year contract, beginning July 1, 1913, to the Greene Cananea Copper Co., at Cananea, Sonora, Mex., where they are smelted.

The water supply of the mill comes from Pinal creek, and from 3 wells, each producing 500,000 gals. daily at the lower end of the Miami wash. Water is taken from Pinal creek by a 25,000' pipe line of 14" diameter. In addition the company buys from the Old Dominion Copper Mining & Smelting Co. 2,000,000 gals. of water daily. Water from the Old Dominion flows to McLean's ranch, near Pinal creek, whence it is pumped by a Nordberg electric pump of 1,500 gals. capacity per minute, to a 50,000-gal. storage tank at the concentrator, and thence distributed through the works in 12" cast-iron mains.

Buildings include a machine shop, warehouses, steel change house, store, boarding house, bunkhouse and upwards of 150 frame dwellings, of 2 to 6 rooms each, for employes, all lighted by electricity. There is a substantial office building, erected at a cost of \$15,000, a club house and recreation hall, on the summit overlooking Miami flat, provided with reading matter, pool tables and games, and a hospital owned jointly with the Inspiration Consolidated Copper Co.

The mine is served by the Gila Valley, Globe & Northern railway, with standard gauge, having an excellent average grade and light curves, so that favorable freight rates are given the mine and mill.

Production was begun March, 1911, and at end of the year a total of 445,036 tons of ore was milled, yielding 20,065 tons of concentrates from which 15,385,783 lbs. fine copper was secured. The output in 1912 was 32,832,609 lbs. fine copper secured from 1,040,744 tons of ore milled and at a cost of 9,588 cts. per lb. Production has been as follows:

	1913.	1912.
	lbs.	lbs.
Six months.....	15,727,369	15,543,783
July	2,890,000	3,014,996
August	3,097,500	2,931,948
September	2,688,600	2,727,022
October	2,862,050	2,897,755
Total	27,265,519	27,115,504

The Miami is a very large and very fine mine and is in worthy hands.

MIAMI INSPIRATION MINING CO.

ARIZONA

Mine address: Care F. W. Ham, sec.-treas., Globe, Ariz. Dan R.

Williamson, pres. Organized under laws of Arizona, capitalization \$500,000, shares \$5 par. Property, about $2\frac{1}{4}$ miles west of Miami, adjoins the Miami Needles Copper Co. on the south and east. Claims are reported to show considerable evidence of mineralization, ore occurring in silicified schist and adjoining Schultze granite. Company developing in a leisurely fashion, 1913.

MIAMI NEEDLES COPPER CO.

ARIZONA

Office: Globe, Ariz. D. R. Williamson, pres.; F. W. Ham, sec.-treas. Organized 1912, capitalization \$500,000, shares \$5 par.

Property, 11 claims on Needle mountain, about 5 miles west of Miami. Claims, slightly developed, show altered schist and Schultze granite, the former with evidences of mineralization along narrow belts. Much of the group is covered by barren Gila conglomerate. Company has made no serious attempt to further develop the property since organization, and apparently is idle through lack of funds.

MICHIGAN-ARIZONA COPPER CO.

ARIZONA

Idle. Office: 2 Ingersoll Blk., Lansing, Mich. Emory W. Olds, pres.; Dr. Ely F. Allen, sec., at last accounts. Organized June 17, 1907, under laws of Arizona, capitalization \$2,000,000, shares \$1 par. Lands, 80 acres, in the Sulphur Springs valley, at the foot of Graham mountain, show two 8" parallel veins of ore assaying up to 29% copper, with traces of gold and silver, opened by a 42' shaft.

MICHIGAN & ARIZONA DEVELOPMENT CO.

ARIZONA

Office: 905 Metropolitan Life Bldg., Minneapolis, Minn. Mine near Helvetia, Pima Co., Ariz. C. C. Prindle, pres.; R. M. Bennett, vice-pres.; Chas. W. Sexton, sec.-treas. This company reorganized the Helvetia Copper Co., under a plan explained Vol. V. Property formerly was a considerable share interest in the Helvetia, and about 40 undeveloped claims adjoining the Helvetia. Reported idle by company in 1913.

MICHIGAN-ARIZONA MINING CO.

ARIZONA

Idle. Office: 17 First St., Muskegon, Mich. Mine near Mammoth, Pinal Co., Ariz. S. H. Hamilton, pres.; Theo. P. Swift, sec.-treas. and engr. Organized Aug. 22, 1904, under laws of Arizona, capitalization \$5,000,000, shares \$1 par.

Lands, 7 claims, 140 acres, in the Bunker Hill or Copper Creek district, 22 miles from a railway, carrying fissure veins and impregnations in brecciated masses of country rock, with porphyritic intrusions. The mine has a 50' shaft and tunnels of 93' and 150', showing cuprite, melaconite, malachite, chalcocite and occasional chrysocolla.

MICHIGAN COPPER & GOLD MINING CO.

UTAH

Office: 502 Newhouse Bldg., Salt Lake City, Utah. Mine office: Frisco, Beaver Co., Utah. Lawrence Green, pres.; Sam S. Porter, vice-pres.; Geo. Winsness, sec.; Rodney T. Badger, treas.; preceding officers, H. M. Dinwoody, H. G. Williams and R. P. Morris; directors; E. Rummelmeyer, cons. engr. Organized Dec., 1902, under laws of Utah, capitalization \$300,000, increased, 1911, to \$1,000,000, shares \$1 par.

Lands, 6 claims, patented, including the New York group, near the Horn Silver mine, 1 mile east of Newhouse, in the San Francisco district, three-fourths mile from the railway. Claims are said to show 12 parallel veins intersecting the main contact. Development is by shafts of 80', 100' and 200' and a 50' tunnel. The mine has a paystreak carrying ore giving assays of 13.3% copper, 2.1% lead and 7.5 oz. silver per ton. Was developing with contract labor, at last accounts.

MICHIGAN COPPER MINING CO.

MICHIGAN

Office: 15 William St., New York. Mine office: Rockland, Ontonagon

Co., Mich. Jos. E. Gay, pres.; John R. Stanton, vice-pres. and treas.; J. Wheeler Hardley, sec.; preceding officers, Geo. W. Drucker and Alfred M. Low, directors; Samuel Brady, supt.; Henry Stubensky, clerk.

Organized Jan. 5, 1899, under laws of Michigan, capitalization \$2,500,000, shares \$25 par; fully issued, \$20 paid in. Last assessment was levied 1909. The company ended 1912 with quick assets of \$16,420 and liabilities \$117,772. Old Colony Trust Co., Boston, registrar; American Trust Co., Boston, transfer agent. Annual meeting, first Tuesday in May.

Lands 4,870 acres of mineral territory, 1,466 acres of timber and miscellaneous lands and a 150-acre mill site, giving total holdings of 6,686 acres, mineral lands being in Secs. 1, 2, 3, 9, 10, 11, 13, 14, 15, 16, 17, 21, 22, 23, 24, 25, 26 and 27, T. 50 N., R. 30 W.

The main tract is 3 miles east and west by $4\frac{1}{2}$ miles north and south, in addition to which there are 4 scattering tracts to the westward, 1 of 40 acres, 2 of 80 acres each and 1 of 160 acres, all carrying the outcrop of the Calico amygdaloid. The Michigan lands include the old Minnesota, Rockland and Superior mines. The Superior mine produced 567,331 lbs. fine copper, 1856-69 and 1876-79. The Rockland, lying next east of the Minnesota, was operated 1853-70, making 6,210,309 lbs. fine copper from the Minnesota contact vein which averaged about 2' width and carried considerable silver in that mine. The old Minnesota mine, opened 1847, closed 1870, made 34,704,668 lbs. fine copper and paid dividends of \$1,820,000. The Minnesota mine is fully described Vol. II.

The Michigan tracts carry the following known copper-bearing beds of the Evergreen belt: Calico, Contact, Minnesota, Branch, North Contact, Knowlton, Mass, Butler, Ogima, North Amygdaloid and South Amygdaloid, and presumably the other parallel beds, in addition to various other unidentified copper-bearing beds of the Keweenaw series. The Knowlton, or northernmost of the Evergreen belt of parallel beds, lies about 1,000' south of the old Minnesota shafts and the 7' amygdaloidal bed supposed to be the Butler, opened to some extent in Penninsula bluff, 2,000' south of "B" shaft, shows some heavy copper and stamp rock. There are 3 old shafts on the Butler bed and a tunnel cutting several parallel copper-bearing strata. There also are cupriferous amygdaloidal outcrops north of the Calico bed on which no work has been done.

The Michigan mine has 3 shafts on the Calico bed and about 10 miles of workings. "A" shaft is 2,133' deep; "B" is bottomed at the 14th level, and "C" at the 11th level. The lode grew steadily poorer with depth and showed a tendency to pinch, being only about 5' wide on the 16th level of "A" shaft, though well charged with copper. The mine was closed down Oct., 1909, continuing about 25 men in exploratory work until the end of 1910, when the property was turned over to tributors, who continued to scam the mine with some profit to themselves and the company until May, 1913, when all work was stopped.

Buildings include a 30x60' machine shop, a stone smithy, carpenter shop, warehouse, office and 22x50' changing house.

The mill, construction of which was begun April, 1906, is about 1 mile north of the Mass mill, on Keweenaw bay, with ample water frontage. Construction was suspended, 1907, though perhaps no more than \$10,000 would be required to complete the mill, on which about \$175,000 has been expended.

Recent production has been as follows: 2,875,341 lbs. fine copper in 1906; 2,665,404 lbs. in 1907; 3,000,206 lbs. in 1908; 1,979,305 lbs. in 1909; 36,682 lbs. in 1910; 327,773 lbs. in 1911; 162,590 lbs. in 1912. The mine has proven a disappointment, and untoward financial conditions have re-

stricted the exploratory and development work that are clearly called for, and which probably will be taken in hand vigorously, when the times warrant. The property is very fully described in Vol X.

MICHIGAN SMELTING CO.

MICHIGAN

Office: 82 Devonshire St., Boston, Mass. Works office: Houghton, Houghton Co., Mich. Wm. A. Paine, pres.; John R. Stanton, vice-pres.; Frederic Stanwood, sec.-treas.; Frederick I. Cairns, supt., and Chas. A. Snow, directors; John Mugford, asst. supt.

Organized 1903, under laws of Michigan, capitalization \$500,000, shares \$25 par. The entire stock issue is owned by 6 mining companies, the Copper Range group holding 12,000 shares and the Stanton companies 8,000 shares, holdings in shares being as follows: Champion, 4,400 shares; Trimountain, 4,400; Baltic, 3,200; Mohawk, 3,200; Wolverine, 3,200; Atlantic, 1,600. No dividends have been paid, profits having been turned back into improvements. Annual meeting, second Monday in January.

Company owns and operates the Michigan smelter, 3 miles west of Houghton, near the old Atlantic stamp mill, with frontage on Portage lake. It was designed by Frank Klepetko and is the largest and most modern smelter in the Lake Superior district, with a capacity of 90,000,000 lbs. fine copper yearly.

The plant is terraced throughout, permitting automatic handling of material. The copper ore (locally mineral) is delivered in 40-ton bottom-dumping steel cars by the Copper Range railroad, which also hauls away the refined copper for shipment from the Copper Range wharves in Houghton.

The 3,000-ton storage bins hold 10 days supply for the works. Mineral is dehydrated in rotary dryers by water gases from the furnaces, taken to the furnaces in tram cars and dumped into hoppers on the charging floor. Coal trestles, on an upper level, hold 15,000 tons of hard and soft coal, with tunnels underneath through which fuel is taken in tram cars, descending by gravity to the furnaces and boiler rooms. There also are separate storage bins for charcoal, sand and limestone.

The 160x205' reverberatory furnace building has three 5-ton traveling cranes. There are 6 furnaces, 2 being 16x36' each, two 14x23' each, one 15x18' and one 16x40' of 100 tons daily capacity. The two 16x36' furnaces were built 18x50', over all, but gave so much trouble that they were cut down to 40' length.

Alternating with the larger reverberatories are one 300-h. p. and two 200-h. p. Stirling water-tube boilers, heated by waste gases from the furnaces. After leaving the boilers the gases are drawn through a 6x8' subterranean flue, with arched roof, up the hill to a 150' smokestack, with base 100' above the furnace building.

The 40x70' blast-furnace building, of steel and brick, has 2 blast furnaces. Blister copper is cast, mechanically, in moulds upon a circular casting table, cooled in water, and carried by a link elevator to the loading platform. Slags are carried mechanically to the sampling mill and reduced in a 30-ton crusher of 1,000 tons daily capacity for resmelting. The slag from the final fusion is granulated by water and discharged through launders to low ground northward for grading.

The combination machine shop and power house, of steel and brick, has a complete equipment driven by an independent engine, and a 300-h. p. Nordberg horizontal tandem-compound engine, driving a 200-kw. generator, actuates the rotary blowers for the blast furnaces. Electric power is used for operating the drying plant, cranes, casting machinery and lighting. There are 3 specially designed Jeffrey electric locomotives, of

100-tons drawbar pull, taking current from the overhead trolleys, hauling 8 pressed steel Sheffield mineral and coal cars, the tracks reaching all parts of the works.

Miscellaneous buildings include a two-story and basement office and laboratory, of brick, heated by exhaust steam, a 40x60' iron-sheathed frame warehouse, barn, etc. The plant has two 50' track scales of 150 tons capacity each, 1 for mineral and 1 for coal and flux, with smaller scales at other points. Water is obtained from the old Atlantic dam, on Cole's creek, through a 4,300' flume with capacity of 5,000 gals. per minute, leading to a 50,000-gal. storage tank, 100' above the works, giving good pressure at all points. The plant is well planned and well handled.

MICHIGAN-UTAH MINING CO.

UTAH

Office: 611 Dooly Bldg., Salt Lake City, Utah. Mine office: Alta, Salt Lake Co., Utah. Norman W. Haire, pres. and managing director; Jas. B. Edwards, vice-pres.; Edwin G. Wooly, Jr., sec.; L. H. Farnsworth, treas.; other directors, Duncan MacVichie, Jas. A. Pollock, R. H. Strickland, Wilbur S. Zehring and D. O. Hastings; Wm. B. Fisher, gen. mgr.; F. D. Brown, purch. agt.

Organized March 4, 1912, under laws of Delaware, capitalization \$2,500,000, shares \$2.50 par, nonassessable; issued, 500,625 shares. Debentures, \$625,000 at 6% authorized; issued, \$597,400. Boston Safe Deposit & Trust Co., transfer agent; American Trust Co., Boston, registrar. Annual meeting, second Tuesday in September. Shares are listed on the Boston curb.

Lands, 79 claims, 1,000 acres, and a 5-acre mill site, patented, in the Alta district, 18 miles from the Denver & Rio Grande railway.

Property shows Paleozoic sediments cut by granite, the ore occurring in fissure veins in limestone, and as contact metamorphic deposits between limestone and granite, having a general strike of N. 65° E., and a dip of 32°. There are 5 distinct and parallel veins, 3 under development, showing average widths of 2½' and traceable 5,000', are reported to carry about 5% copper, 20% lead, 1% zinc, 34 oz. silver, and \$1 gold per ton. Ores are carbonates at and near surface, succeeded below by sulphides.

Development is principally by tunnels, all workings being in the oxide and carbonate zones, but sulphides are proven to occur in depth by workings of the Columbus Consolidated Mining Co., near by. Total underground openings, 1913, aggregated nearly 50,000', about one-half being represented by tunnels, drifts and crosscuts that are all in ore, raises and winzes aggregating 10,500' additional. Ore is transported by aerial tramway to Tanners flat, 5 miles from the mine, and thence by wagon road and railway to the Midvale smelter. The tram has a maximum capacity of 200 tons daily.

Output, 1912, was 1,500 tons of about 5.5% copper ore. Average cost of mining and smelting per ton of ore was \$14.65 and \$4.77 respectively.

Equipment includes two 90-h. p. hoists, and a 12-drill Ingersoll Rand air compressor. A small concentrator is run by a 200-h. p. steam plant but mine uses electric power throughout.

Buildings include a 20x50' machine shop, a carpenter shop, several dwellings and a 20x30' smithy, located underground as a measure of protection from snow slides, which are of frequent occurrence in this region.

Property considered promising and management good.

MICHOCAN RAILWAY & MINING CO., LTD.

MEXICO

Address: G. A. Mitchell & Co., secretaries, 2 Suffolk Lane, Cannon St., London, E. C., England. Mine office: Anganguero, Michoacan, Mex. Works office: Ocampo, Zitacuaro, Michoacan, Mex. Henry W. Forster, chairman; G. A. Mitchell and C. H. Potter, directors; J. M. Pircher, representative.

Organized Jan. 29, 1889, under laws of Great Britain, capitalization £105,364, shares £1 par, in £21,015 "A" noncumulative 7% preference shares, £12,190 "B" noncumulative 7% preference shares, £70,745 ordinary shares, and £1,414 founders' shares; issued, £99,370. Debentures, £27,090 of 5% prior lien bonds, and £103,000 of 4% mortgage bonds. Is in arrears of interest on mortgage bonds. The railway rights originally held have been disposed of to the Michoacan & Pacific Railway Co., in which the company has a £60,000 share interest in addition to £18,600 bonds held.

Lands 537 hectares known as the Anganguao silver mines, opened by tunnels and variously reported to have 14 to 30 kilometers of workings.

The smelter, known as Los Trojes, of 250 tons rated daily capacity, has a 44x163" water-jacket blast furnace, and 8 blowers. Coke and charcoal are burned in equal quantities, latter being made from the company's own timber. Equipment includes two 4' Pelton water wheels, operated under a 450' head, a small electric plant, and a 150-h. p. auxiliary steam plant. The property was leased, 1909, for 10 years, to the American Smelting & Refining Co.

MIDAS COPPER CO.

ALASKA

Mine office: Valdez, Alaska. George Baldwin, Wm. Wilson, Geo. C. Trent, A. E. Grigsby, T. J. Devinney, G. H. Plant and John Feinbloom, directors. Organized 1912, capitalization \$1,000,000, shares \$1 par. Mine bonded to Granby Consolidated Mining, Smelting & Power Co., Ltd., 1913.

Property, 12 claims, 9 in 1 group and 3 in another, in Solomon basin, 790' above tide water and 6 miles from Valdez bay. Claims show an ore deposit from 25 to 200' wide, stripped in 8 places and traceable 1,500', running N. 70° W. and dipping 45° S. W. Ore carries chalcopyrite mixed with pyrite in a slaty gangue, and 100 tons shipped, 1911, carried 8.9% copper and \$2 gold with 10% silica and 34% iron.

Development is by a 2,000' crosscut tunnel with 400' upper level and 700' lower level, all in 7% ore. Recent development made under a \$540,000 bond by the Alaska Syndicate, Sept., 1912, to June, 1913, consists of 1,700' of workings said to block out 200,000 tons of 7% ore. Ore as a whole is said to average about 6% copper and \$2.40 gold.

MIDDLE SWANSEA MINING CO.

UTAH

Office: 408 South State St., Salt Lake City, Utah. Mine office: Robinson, Juab Co., Utah. Richard B. Shepard, pres. and gen. mgr.; Emma C. Shepard, sec.-treas., at last accounts. Organized 1899, under laws of Utah, capitalization \$5,000, shares 1 ct. par; issued, \$4,800. Assessments were \$3,500 to end of 1910. Annual meeting, first Monday in January.

Lands, 4 claims, unpatented, 70 acres, adjoining the Eureka-Swansea Extension mine, showing quartzite and limestone, with development by shafts of 155' and 60'. Idle, except for annual assessment work.

MIDDLEMARCH COPPER CO.

ARIZONA

Office: 212 Henne Bldg., Los Angeles, Cal. Mine office: Middlemarch, Cochise Co., Ariz. H. Bert Ellis, pres.; F. C. Austin, vice-pres.; Wm. King Gird, sec.; Wm. LeMoyné Wills, treas.; preceding officers, Mrs. M. M. O'Gorman and Mrs. Richard Gird, directors; Edw. J. Kelly, supt. Organized April 26, 1907, under laws of California, capitalization \$1,000,000, increased March 28, 1906, to \$3,000,000, shares \$100 par. Absorbed the Cobreloma Consolidated Copper Co., about 1907. Annual meeting, first Monday in April.

Lands, 68 claims, 1,360 acres, in the Dragoon mountains, showing several contact deposits between limestone and granite-porphry, having a generally northwest strike, with dip of 42 to 54°. The 2 orebodies under

development, said to be 30 to 80' wide, show oxidized ores succeeded by chalcopyrite, with some chalcocite.

Development is by 9 shafts, deepest 210', and by tunnels of 625', 450' and 390', with 3 others, the total workings being about 2 miles, estimated by management to show 200,000 tons of ore, with 100,000 tons blocked out for stoping in the Missouri mine, with ore in other properties, though not extensively developed.

Equipment includes a 300-h. p. steam plant, 50-h. p. hoist and 4-drill Laidlaw air compressor. There are 12 buildings, including a 30x38' engine house, 32x38' boiler house, 30x38' machine shop and 20x30' smithy.

The reduction plant includes a concentrator and smelter in a 40x100' building. The mill of 50 tons daily capacity, receiving ore by a 300' ground tram from the portal of the Missouri tunnel, has an 8x12" Blake crusher, 2 Huntington mills, 2 rolls, 2 Bartlett tables, 1 slime table and 3 sizers. The smelter, when operated, made matte averaging 55 to 70% copper, 20 to 100 oz. silver and 0.25 to 2 oz. gold per ton. Work, 1912, was confined to the Cobreloma claim, about 200' of new openings showing mainly bornite of about 5% copper tenor. Property considered promising.

MIDNIGHT MINE.

ARIZONA

Office: care St. Charles Bros., owners, Kingman, Ariz. Mine near Chloride, Mohave Co., Ariz. Daniel S. Richards, superintendent, at last accounts. Mine has a deposit of gold-copper ore developed by a 200' shaft. Equipment includes a 10-stamp mill and concentrator turning out about 50 tons of concentrate a month in the summer of 1913, shipped to the Copper Queen smelter at Douglas, Ariz.

MIDWAY COPPER MINING CO.

UTAH

Presumably dead, as Utah corporation tax has not been paid for several years.

MILAN MINING & MILLING CO.

NEW HAMPSHIRE

Office: P. O. Box 666, Portland, Me. Mine office: Milan, Coos Co., N. H. F. H. Bradford, pres.; R. C. Bradford, treas., and J. B. Carper, directors; D. R. Andrews, supt. Organized Aug., 1907, under laws of Maine, capitalization \$100,000, shares \$100 par, nonassessable.

Lands, 400 acres, freehold, including 240 acres of mineral lands, 140 acres of timber land and a 20-acre mill site. The property, first operated 1875-80, shows pre-Cambrian slates, schist and serpentine, carrying 2 overlapping lenses, of 3 to 10' width, in an ore channel, in mica-schist, having a generally N. W. strike, with average dip of 70°. One lens, under development, of 4' minimum and 20' maximum width, is reported by the company as traceable 8,000', and to average 2% copper, 4% zinc, 25% sulphur, 1 oz. silver and \$1 gold per ton. Development is by 4 short tunnels, and 2 shallow shafts.

Equipment includes a 150-h. p. steam plant, with a 35-h. p. hoist and a 20-drill air compressor. There are 10 frame buildings, including machine shop, smithy and carpenter shop.

The mill is equipped with two 10x20" Dodge crushers, 2 sets of rolls, 5 Wilfley tables, 1 slime table and a Richards classifier, making concentrates carrying about 1.25 to 1.75% copper, and 42 to 45% sulphur.

The property is served by the Grand Trunk railway with a siding to the mine and mill. An automobile has been transformed into a locomotive, by replacing the rubber-tired wheels with flanged iron wheels.

The company plans manufacturing sulphurous gas, from lump pyrites and second-grade pyritic concentrates, pumping the gas 8 miles in a 2" pipeline to sulphite manufacturers and selling the cinder to smelters for

copper values. Management estimates costs at 75 cts. per ton for mining and 50 cts. for concentrating.

MILITARY MINING & MILLING CO., LTD.

IDAHO

Office and mine: Burke, Shoshone Co., Idaho. Fred Bergen, pres.; L. H. Hays, sec. Capitalization \$1,000,000, shares \$1 par. Lands, 2 claims near Burke showing a 5' vein said to be traceable 2,000', carrying copper with quartz and quartzite gangue, developed by a 57' shaft. Dormant several years.

MILLER HILL MINING CO.

UTAH

Idle. Office: Knight Block, care Knight Bros., Provo, Utah. Mine office: American Fork, Utah Co., Utah. Jesse Knight, pres.; J. C. Jensen, vice-pres.; R. E. Allen, sec.-treas. Capitalization \$100,000, shares 10 cts. par. Shares are listed on the Salt Lake Stock Exchange. Lands, 23 claims, adjoining the Mineral Flat mine, developed by shaft, with about 400' of workings.

MILLER MINING & SMELTING CO.

UTAH

Office: P. O. Box 7, Salt Lake City, Utah. W. A. Wilson, general manager. Lands, 10 claims, patented, 56 acres, in American Fork canyon. Ore carries a little copper, with mainly gold, silver and lead values. Management reports production of \$1,600,000 to end of 1912. Company inactive at present and property shut down.

MILLS & CO., CHAS. S.

MEXICO

Idle. Office and mine: Sierra de Oro, Horcasitas, Sonora, Mex. Chas. S. Mills, managing partner. Property, the Sierra de Oro mine, 81 hectares, 28 miles from Pesqueira, adjoining the Sultana and San Jose mines of the Giroux Consolidated Mines Co. Lands carry extensions of the Giroux veins and other contact deposits, in limestone, adjoining porphyry intrusions and rhyolite flows. Claims have 5 veins of 2 to 100' width, carrying copper, silver and gold, with a little nickel, cobalt and platinum. Development is by a 100' shaft and a 440' tunnel.

Equipment includes steam power, and a 20-ton stamp mill and concentrator. Mine closed down.

MINA MEXICO CO.

MEXICO

Is the operating and Mexican company of the Chicago Exploration & Development Co., operating the Mexico mine, 45 miles from Tonichi, Sonora, Mex. W. E. Pomeroy, mgr.; Geo. B. Squire, supt. of smelter; Chas. Gercken, mine supt. Has 85-ton charcoal burning smelter. Was working up to Sept., 1913, and reported to have 500 tons of copper concentrate carrying 100 oz. silver per ton ready for treatment.

MINERAL FARM DEVELOPMENT CO.

ARIZONA

Office: 64 W. Randolph St., Chicago. Property, the Mineral Farm group of 21 claims, 2 miles northeast of Globe, under bond and lease from Globe Mining Co.

Lands show altered sedimentary and igneous rocks, with iron dikes and a complex fissure system. There are 2 veins of 4' and 20' width, carrying gold and silver-bearing copper ore of good grade. Development is by a 400' shaft.

Equipment includes a 60-h. p. boiler, 8x10" hoist and an air compressor. Company had 3 men engaged in development work at last accounts.

MINERAL FLAT EXTENSION MINING & MILLING CO.

UTAH

Letters unclaimed at Provo, Utah. Mine office: Carbonate, Juab Co., Utah. Jos. I. Bullock, pres.; F. E. Brown, sec.; Wm. H. Horner, supt. Organized March, 1909, under laws of Utah, capitalization \$50,000, shares 5 cts. par, assessable. Property, 2 miles south of Alta, in Little Cottonwood district, White Pine canyon. Claims show a 3' vein of auriferous and argen-

tiferous copper ore, giving assays up to 50% copper, also silver-lead ores, developed by tunnel and shaft, with drifting on vein. Company has kept up assessment work on its unpatented claims.

MINERAL FLAT MINING CO.**UTAH**

Office: Provo, Utah. Mine office: American Fork, Utah Co., Utah. Jesse Knight, pres.; J. C. Jensen, mgr. Organized under laws of Utah, capitalization \$100,000, shares 10 cts. par, assessable. Shares are listed on the Salt Lake Stock Exchange. Company's statement of Sept. 1, 1911, showed receipts of \$3,292 for the preceding year with balance on hand of \$657. Company's only source of revenue is the rental of \$50 a month received for the use of its power plant. Lands, 22 claims, partly patented, 25 miles from a railway, carrying lead and copper ores. The mine, developed rather poorly, has a 100' shaft and tunnels of about 1,500' aggregate length, upper levels showing occasional bunches of good ore, but without continuity of payable mineral. Equipment includes a hydro-electric plant, with a 9,000' pipe line and several buildings. Idle since June, 1910, except for annual assessment work.

MINERAL HILL CONSOLIDATED COPPER CO.**ARIZONA**

Office: 331 Fourth Ave., Pittsburg, Pa. Mine office: Tucson, Pima Co., Ariz. M. S. Isherwood, pres.; Boon Ingells, vice-pres.; E. B. Reeser, sec-treas. and gen. mgr. Organized March, 1904, under laws of Arizona, as successor of Azurite Copper & Gold Mining Co., capitalization \$3,000,000, shares \$1 par.

Property, the Azurite mine with 26 claims, 12 patented, 520 acres, in the San Xavier district, 18 miles southwest of Tucson. The Azurite group of 13 claims is said to have produced \$550,000 worth of ore under former ownership. Company's lands also include the American group of 8 claims and the Mineral Hill group of 5 claims. The mine is claimed to have a large body of sulphide ore averaging about 3.5% copper.

Development is by 74 pits and open cuts, 8 tunnels, mostly short, longest being 250', and 48 shafts, mostly shallow, deepest being 345', mine having a total of about 1 mile of workings. The company operated in 1912 but closed down in Sept., 1913. An Edison electric concentrator has been ordered for the mine according to the press.

MINERAL HILL TUNNEL & COPPER MINING CO. WASHINGTON

Address: F. E. Houghton, Room 1140 Old South Bldg., Boston, Mass. Mine office: Danville, Ferry Co., Wash. Lewis A. Crosby, pres.; A. L. Bradley, gen. mgr. Organized 1906, as successor of Minnehaha Copper & Gold Mining Co., capitalization \$2,000,000, shares \$1 par.

Lands, 700 acres, in 8 groups, about 5 miles from the Granby smelter, lying at an average distance of 2 miles south of the international boundary line, in the Curlew district, Ferry county, Wash. The Minnehaha group, 4 claims, 80 acres, has several shafts, deepest 500', and a 3,000' tunnel, the upper workings showing a vein of low-grade auriferous copper ore, with a 12" paystreak of ore of good average assay tenor. Idle and in process of reorganization.

MINERAL LANDS COMPANY.**UTAH**

Idle. Office: 36 Exchange St., Portland, Me. Mine address: Bingham Canyon, Utah. J. A. Waterman, treas. Organized, 1913, under laws of Maine, capitalization \$500,000, shares \$5 par. Company owns entire capital stock of the Markham Gulch Mining & Milling Co.

Property, the Red Wing and Butler-Liberal mines, with about 300 acres in Markham gulch, formerly owned by the North Utah Co. of Bingham, Utah. The claims carry the Florence and Erie fissures, latter having been a good producer in the upper levels. Development is mainly by tunnels,

with about 5 miles of workings, showing ores carrying lead, silver, copper and gold values, in about the order named.

Equipment includes a good machinery plant, with a 200-h. p. electric hoist, and a 12-drill Franklin air compressor.

MINERAL MINING CO.

ARIZONA

Address: Kingman, Mohave Co., Ariz. Company said to be drilling a group of claims south of Kingman held under lease and bond, Oct., 1913.

MINERAL MOUNTAIN MINING CO.

UTAH

Mine address: Lucin, Box Elder Co., Utah. C. F. Whipple, managing director. Organized March, 1909, under laws of Utah, capitalization \$100,000, shares 10 cts. par.

Property, 7 claims, patented, developed by tunnel, showing a contact deposit between limestone and porphyry. Ore occurs principally as replacements in the limestone, carrying mainly silver and lead, with a little malachite at and near surface. Was developing with small force, at last accounts.

MINERAL POINT MINING CO.

ARIZONA

Idle. Property, 15 claims, in the Black Hills range, 8 miles from Junction, Yavapai Co., Ariz. Mine has a 225' shaft said to show a 2' vein of sulphide ore, carrying good values in copper, silver and gold.

MINES DEVELOPMENT CO. OF NEVADA.

NEVADA

Office and mine: Lovelock, Humboldt Co., Nev. John T. Reid, pres., treas. and gen. mgr.; Paul G. Reid, sec. and supt.; preceding officers, R. C. Moore, J. Thies, Peter Ancher and E. T. Loring, directors. Organized Sept. 1, 1904, under laws of Arizona, capitalization \$750,000, shares \$1 par; issued, \$447,996.

Lands, 5 claims, 100 acres, in the Juniper Mountain district, showing various fissure veins, alongside of quartz porphyry dikes, intrusive in monzonite. Veins run north 10° west and are nearly vertical. The vein developed averages 5' wide, is traceable for 2,000' and proven to 170' depth. Small seams of ore found at or near surface show chalcocite, bornite and tetrahedrite, giving average assays of 2% copper, 11 oz. silver and \$3.50 gold per ton. Development is by a 30' shaft and 365' tunnel. Company plans resumption of work, 1913, and 1,000' of new development.

MINGUS MOUNTAIN COPPER CO., LTD.

ARIZONA

Office: 516 Grant Bldg., Los Angeles, Cal. Mine near Jerome, Yavapai Co., Ariz. W. W. Thomas, pres.; A. Gleason, sec., at last accounts. Organized March, 1900, under laws of Arizona, capitalization \$3,000,000, shares \$1 par; issued, \$2,400,000.

Lands, 5 claims, 100 acres, in the Black Hills district, 12 miles south of Jerome, the nearest railroad point. Claims show 3 fissure veins carrying oxide and sulphide ores. 1 vein having a claimed extreme width of 40' and said to be traceable 4,000', giving good surface showings of carbonate ores, assaying up to 16% copper. Development is by shafts of 120', 430', 250' and 370', with several tunnels, giving a total of 4,240' of workings.

Equipment includes a 50-h. p. steam plant, with 2 hoists, good for 1,000' each, and several mine buildings. Out of cash and idle some years.

MINING ISSUES CO.

NEW YORK

Was organized to finance the Inspiration Copper Co. Paid a single dividend of 218%, and was dissolved, 1911.

MINNEAPOLIS COPPER CO.

MEXICO

Office: 550 Security Bldg., Minneapolis, Minn. Mine address: Cumpas, via Nacozari, Sonora, Mex. Geo. H. Heising, pres.; M. K. Emery, sec.; Wm. Kemp, gen. mgr. Organized June, 1906, under laws of South Dakota, capitalization \$1,000,000, shares \$10 par, nonassessable, and is organized

under laws of Mexico as Minneapolis Copper Co., S. A., the South Dakota corporation being a holding company. Is operated in the United States under the title of Minneapolis Copper Development Co., the reason for which has not been explained.

Lands, 277 hectares, about 30 miles southeast of Cumpas. Property carries several fissure veins, in andesite, with northeast strike, of which 4, under development, are of 5 to 8' estimated average width, carrying tetrahedrite, estimated by company to average 10% copper, with traces of lead and zinc, 5 to 40 oz. silver, and \$1 and upwards in gold, with occasional very high assays. The property has been under development continuously with a small force, since the company took it in 1906. The 155' Fryer shaft develops a 4' vein carrying ore said to average about 9% copper and 20 oz. silver per ton.

The Archipelago mine, the principal property, has a 250' incline shaft, and the mine as a whole has about 8,000' of workings, mostly in ore.

Equipment includes a 35-h. p. gasoline hoist and there are 5 buildings of stone, including a 40x120' general quarters building, housing the office, store, etc. There is also a 75-ton smelter, built in 1912, and company, early 1913, was making 8 to 10 tons matte daily, which was being shipped to the Copper Queen smelter.

Transportation is by wagon-road to Cumpas, freight being carried in two 90-h. p. gaso-electric trucks.

Mine was reopened in the summer of 1913 and the smelter reported to be working, but in September property was closed down and creditors were trying to get a satisfactory settlement without taking over the property.

MINNEAPOLIS-CORBIN COPPER CO.

MONTANA

Office: 10 South Fourth St., Minneapolis, Minn. Mine address: Corbin, Jefferson Co., Mont. Philip B. Winston, pres.; Albert H. Hall, sec.; Thos. F. McCue, treas.; Patrick Meany, gen. mgr., at last accounts. Organized April 23, 1909, under laws of Minnesota, capitalization \$500,000, shares \$5 par, assessable.

Lands, 7 claims, 140 acres, in process of patenting, near the Alta and Boston & Corbin mines. Property is said to carry 9 large fissure veins, principal being the Moonlight, estimated at more than 100' in width, with 2 veins on the Anaconda claim said to be 15' and 50' in width, respectively. Development is by No. 1 incline shaft, of 176' depth, and No. 2 vertical shaft, of 240', with 380' of workings. Stringers of rich ore have been encountered in the vertical shaft from a depth of 30' to the bottom, which shows streaks of chalcocite, and the entire vein at the bottom is estimated to average about 4% copper, 8 to 10 oz. silver and 80 cts. to \$1.40 gold per ton. Property idle and company dormant.

MINNESOTA-ARIZONA COPPER CO.

ARIZONA

Office: Willmar, Minn. Mine office: Copper Creek, Graham Co., Ariz. Col. Frank J. Sibley, pres.; Martin E. Tew, vice-pres.; Walter De La Hunt, sec.-treas.; preceding officers, E. Osterholz, R. W. Stanford and J. Emil Nelson, directors; R. Roy Sibley, gen. mgr.; C. S. Gesler, supt. Organized April 29, 1908, under laws of Arizona, capitalization \$3,000,000, shares \$1 par, nonassessable; issued, about \$2,000,000. Annual meeting, second Tuesday in April. Company is closely affiliated in management and ownership with Calumet & Copper Creek Mining Co., and apparently is a subsidiary of that concern.

Lands, 9 claims, 190 acres, in the Bunker Hill district, adjoining the Calumet & Copper Creek holdings, in 2 groups, southern of 4 claims. The Silver Reef claim, in the southern group, is claimed to show a rich vein of cuprite at surface and has a 40' shaft. The Kimbro claim has a 100' shaft

with a 25-h. p. electric hoist, and the Lead Carbonate claim has a 100' tunnel showing lead and copper sulphides. Company reports country rock as granodiorite, with porphyry intrusions, ore being carried in the original magma, with 7 known orebodies, of which 3, under development, are reported to show oxidized ores near surface, succeeded by bornite and chalcocite, with chalcopryrite below 200' depth. The Lead Carbonate claim is said to carry a 10' vein of auriferous and argentiferous galena. Company reports 2,000' of workings, with 1 body of disseminated copper ore of 72' width, and estimates ore to average 3.25% copper. Electric power is taken from the Calumet & Copper Creek Mining Co. Unfavorably regarded.

MINNESOTA NEVADA INVESTMENT CO.

NEVADA

Office: 436 Endicott Bldg., St. Paul, Minn. Mine near Fairview, Churchill Co., Nev. Alf. Patterson, pres.; O. S. Deringer, sec.; M. P. Ryan, treas.; A. A. Day, gen. mgr.; Chas. A. Peet, mg. engr. Organized Aug. 6, 1906, under laws of Oklahoma, capitalization \$1,000,000, shares \$1 par; issued, \$690,000. Annual meeting, Aug. 6.

Property, 28 claims, 160 acres placer ground, total about 750 acres, on Chalk mountain, 3½ miles north of Fairview. Claims said to show several orebodies, of which 3, under development, are 6' average width and proven to depth of 126', showing 2% copper, 32% lead, 26 oz. silver and \$8 to \$20 gold per ton.

Development consists of 3 shafts, deepest being 126'. Company reports a shipment of 2 tons to the Hazen smelter, 40 miles distant, which netted \$82 per ton, values being mostly in lead and silver.

Company succeeded to the property of the Corinthian Mining Co. and Chalk Mountain Copper Co.

MINONG COPPER CO.

MICHIGAN

Office: 122 Winder St., Detroit, Mich. Louis O. Broadwell, pres.; Hugh A. McPherson, sec. Organized Dec. 16, 1874, capitalization \$1,000,000, shares \$25 par.

Lands, 1,455 acres in Secs. 22, 23, 26, 27, 34 and 35, T. 66 N., R. 35 W., lying at the head of McCargo's Cove on Isle Royale. Property shows a line of ancient pits, largest 400' and about 1½ miles long, showing very extensive ancient operations. Idle since about 1881.

MISER'S CHEST MINE.

NEW MEXICO

In the Lordsburg district, Grant Co., N. M. Reported to be shipping silicious copper-gold ores to the El Paso smelter.

MISSABE-MORENCI DEVELOPMENT CO.

ARIZONA

Idle. Office: 21 Fourth Ave. West, Duluth, Minn. Mine near Morenci, Graham Co., Ariz. Richard Lakenan, pres.; I. H. Knapp, sec.-treas., at last reports. Organized under laws of Arizona, capitalization \$600,000, shares \$2 par.

Lands, 15 claims, 300 acres, the Stevens, Campbell and Dell Potter claims being owned outright, with the Dick Lakenan group of 12 claims, 8 patented, held under bond and lease. Property, in Gold gulch, is 2 miles southwest of Morenci. Company has side-line agreements with the Arizona Copper Co., Ltd., and Detroit Copper Mining Co. The Campbell claim is said to have produced \$45,000 worth of very rich ore. The mine has a 300' shaft, with steam power and hoist.

MISSOULA COPPER MINING CO.

IDAHO

Office and mine: Mullan, Shoshone Co., Idaho. Henry Billberg, pres.; C. A. Barnes, vice-pres.; Thos. G. Kennedy, sec.-treas.; R. J. McLeod, gen. mgr.; preceding officers, Harry Cheney, J. N. Thennes and John Brown, directors. Organized 1901, under laws of Idaho, capitalization \$100,000, increased, 1907, to \$1,500,000, shares \$1 par, assessable; issued, \$1,350,000.

Shares are listed on the Spokane and Vancouver stock exchanges. Annual meeting, first Tuesday in November.

Lands, 10 claims, about 175 acres, at the head of Deadman gulch, adjoining the Lucky Calumet, and about 1½ miles northwest of the Snowstorm, in the Hunter district. Property has a strong fissure vein, of 85' maximum width, in Revett quartzite, carrying native copper, cuprite, azurite, malachite, bornite and chalcopyrite, with values mainly in sulphides, ranging in tenor from about 1%, on the hanging wall, to 8% on the foot-wall, with high-grade streaks, ore averaging about one-half oz. silver per unit of copper. The property also carries some argentiferous galena.

Development consists of a 1,400' upper tunnel and a 2,800' lower tunnel, with a connecting shaft and nearly 1 mile of workings. The main tunnel runs N. 30° E. for 1,900', then N. 70° E. for 700', passing from purple St. Regis slates at the portal into Revett quartzite. (Geology described U. S. G. S. Bull. 540, E, p 48, 1913.)

Equipment includes a 100-h. p. electric plant, with an 8-drill air compressor and necessary mine buildings.

The management plans driving a third tunnel of 5,500', as the National Copper Co. has recently opened up very large amounts of copper ore on what is supposedly the same orebody at 1,000' greater depth. The company will probably start development on this level during the winter. Property considered promising.

MISSOURI COPPER MOUNTAIN MINING CO.

MISSOURI

Office: 323 West Seventh St., Sedalia, Mo. Works office: Sullivan, Franklin Co., Mo. L. M. Barnard, pres.; W. D. Scoble, vice-pres.; Wm. H. H. Myers, sec. Organized Jan., 1903, under laws of Arizona, capitalization \$1,500,000, shares \$1 par; issued, \$1,396,000.

Lands, about 7,000 acres in Crawford and Washington counties, Missouri, this including some farm lands. The Copper Hill mine, 32 acres, worked in a small way before 1850, shows an orebody with a good gossan in magnesian limestone. Development is by a 140' shaft and about 1,200' of tunnels. In 1913 company was making an open-cut, 40' wide and 200' long at base of hill, showing 30' of ore running as high as 36.3% copper. Ore deposit shows carbonate and sulphide ores, with a hematite gangue claimed by the company to average about 12% copper. The lands are also claimed to carry iron ore, lead, nickel, zinc and coal.

Equipment includes a 60-h. p. steam plant, with 2 hoists good for depth of 300'.

The reduction plant includes a mill and smelter, former having a Blake crusher, 18" and 22" rolls, 4 New Century jigs, a Card table and hydraulic classifiers. The smelter has a 30-ton Allis-Chalmers blast furnace and a Connersville blower.

Company plans to work its large iron deposits open cast, to do which it will be necessary to first remove an overburden of 70 to 120' thickness. This work was expected to be in progress some time in 1913.

MIZPAH CONS. COPPER & GOLD MINING CO.

NEVADA

Office: East Ely, Nev. Eastern office: 913 Crozier Bldg., Philadelphia, Pa. Mine office: Mizpah, Elko Co., Nev. Robt. T. Seagrave, pres.; Harry Darlington, sec. and gen. mgr.; H. P. Cryst, treas.; John F. Crow, supt. Organized April 7, 1907, under laws of South Dakota, capitalization \$1,000,000, shares \$1 par, nonassessable; issued, \$751,250. Annual meeting, third Monday in January.

Lands, 23 claims, unpatented, 460 acres in the Dolly Varden district, 20 miles east of Mizpah, on Nevada Northern railroad, and 5 miles from its tracks. Claims show several orebodies occurring as fissure veins in

granite and as contact deposits between granite and rhyolite, of which 1, under development, is estimated by the management at 200' width, carrying mainly bornite and chalcopryite ore. Development is by a 70' two-partment shaft showing a 3' orebody, giving maximum assays of about 15% copper, 8 oz. silver and \$18 gold per ton, which are not to be considered as average ore values. Company is now driving a tunnel 1,260' long in August, expected to cut ore at about 1,400'. Property considered promising.

MIZPAH COPPER MINING CO., LTD.

IDAHO

Address W. R. Belvail, Palouse, Wash. Mine office: Harvard, Latah Co., Idaho. C. E. Frederick, pres.; J. C. Northrup, vice-pres. and gen. mgr.; W. F. Chalenor, sec.-treas.; preceding officers, E. R. Northrup and F. P. Miller, directors; J. J. Stanford, engr. Organized Sept. 4, 1906, under laws of Washington, capitalization \$1,500,000, shares \$1 par, nonassessable. A \$50,000 bond authorization is unissued.

Lands, 18 claims, 318 acres, sometimes known as the Hoodoo mine, well watered and timbered, on Copper mountain, near the Palouse river, in the Hoodoo district, Latah county, about 40 miles from Palouse, with a 20-mile wagon-road to Harvard, and 10 miles from the Puget Sound railway. The property shows quartzite and schist, with 8 fissure veins in quartzite, serpentine and schist, having a northeast strike, and dip of about 40°. The 2 being developed are estimated by the management at 40' average width, carrying cuprite, malachite, chalcocite and chalcopryite, latter associated with pyrrhotite, with quartz and limestone gangue, said by management to average 6% copper, 2 oz. silver and \$2 gold per ton. The veins are traceable 2,000' on the company's lands by outcrops showing carbonates, and there are intrusive porphyry dikes.

Recent development consists of No. 5 crosscut tunnel, 700' long to cut vein 250' below old workings. Other work includes the 50' Baby Grand shaft, sunk in gossan and leached ore, connected with No. 3 tunnel by a 175' winze. There are 5 tunnels, No. 1, the Hecla tunnel, being a crosscut, tapping the vein at 81', with a little drifting thereon. No. 2 tunnel is a 150' crosscut showing good ore. No. 3 tunnel, above Nos. 1 and 2, is 500', in a vein carrying chalcopryite ore. No. 4 tunnel, known as the Chalenor, cuts at 70' from the portal a 50' vein with drifts thereon showing chalcopryite ore. The mine as a whole has 2,000' of workings, estimated by the management to show 100,000 tons of ore.

Equipment includes 60- h. p. gasoline power, with a 3-drill air compressor, and there are 16 buildings with accommodations for about 50 men.

A 50-ton concentrator is planned. Property shut down March and reopened Aug., 1913, employing 9 men.

MOCTEZUMA-ARIZPE DEVELOPMENT CO., S. A.

MEXICO

See Mexican Metals Co.; also Vol. VI.

MOCTEZUMA COPPER CO.

MEXICO

Office: 99 John St., New York. Mine office: Nacozari, Moctezuma, Sonora, Mex. Dr. Jas. Douglas, pres.; Arthur Curtis James, vice-pres.; Geo. Notman, sec.-treas.; J. S. Williams, Jr., gen. mgr.

Organized 1896, under laws of West Virginia, capitaliaztion \$3,000,000; issued, \$2,600,000. Is controlled through entire stock ownership by Phelps, Dodge & Co., Inc., and holds direct title to lands through Moctezuma Copper Co., S. A., organized Feb. 4, 1896, under laws of Mexico, with capitalization 500,000 pesos. Dividends were 77%, or \$2,262,000, 1902-07, with no dividend in 1908, \$988,000 in 1909, and \$2,118,569 in 1912. Surplus, Dec. 31, 1912, after writing off \$427,645.92 for depreciation, was \$2,968,631.52.

Property, about 2,000 acres of mineral land in the Moctezuma and Arizpe districts of Sonora, including the Pilaes de Nacozari mine 6 miles

east of Nacozari, and the company also owns the Juarez and Nicolas ranches of about 35,000 acres, which carry considerable valuable timber.

The Pilares mine lies in a high and precipitous country near the divide of the Yaqui and Oposura rivers. The ore deposit is a large pipe, or chimney, of rock breccia cemented by ore. The rock fragments are angular, of all sizes up to masses over a ton in weight and consist of creamy-tinted, hard but altered fine-grained felsitic, rhyolitic porphyry. The orebody has an elliptical cross section 2,000' long and 600' wide. The ore carries chalcopyrite with pyrite and some bornite, the ore being mostly of concentrating grade, averaging 2.3% copper as mined. The deposit has no clearly-defined footwall and the hanging dips at an angle of about 80°. There is a small outcrop of rich carbonate ore, but croppings are mainly red-stained porphyry, carrying considerable low-grade hematite. The leached zone is about 20' in depth only, with payable ore coming in at depth of about 60'.

In addition to the Pilares mine, the company owns a number of other properties that have been operated for several years past by lessees, these mines including the Churunibabi, Bella Union, Fortuna, San Francisco, El Vaquero and San Pedro. The Bella Union has high-grade ore, including oxides and native copper, shipments assaying up to 39% in copper tenor, with small gold and silver values. The Churunibabi property, operated by Col. Norton Hand for several years, yielding \$100,000 worth of silver ore, will hereafter be operated by the company, a rich gold-silver-copper orebody having been struck July, 1913.

The mine is worked by 3 shafts, 1 at each end of the orebody, and by the Porvenir adit-tunnel, a mile long, which taps the deposit 600' below the surface, the 25-ton narrow-gauge railway cars running from Nacozari into the tunnel direct to the mine ore chutes. The mine has three 3-compartment main working shafts, the Guadalupe 1,100', the Pilares 1,000' deep and the Esperanza shaft, 700' deep. The Porvenir tunnel has storage bins in a 25x100' chamber to which ore is milled down from the upper workings, no ore being hoisted, all ore as broken being sent in chutes to the tunnel. Ore is hauled by 6-ton General Electric locomotives in 25-ton Ingoldsby steel side-dumping cars, in trains of 7, to the portal where steam locomotives take the cars.

The mine is opened by levels 100' apart, every alternate level being used as a stoping base, the others for ventilation, waste and supply distribution and development. Up to the present most of the output comes from above the tunnel level known as the 700.

The mine employs 2 methods of ore extraction, the room-and-pillar with waste filling as work progresses, and the newer method of shrinkage stoping with waste filling after all of the ore has been extracted.

The mine has some enormous stopes, No. 4 stope, on the 3d level, having been 85' high, 125' wide and 150' long. The ground stands very well and the systems of extraction used give minimum timber requirements at a cost of only a few cents per ton of ore mined. Costs are about 3 pesos per metric ton for ore loaded on the tram cars. No water is hoisted above the Porvenir tunnel level and very little water is raised from the workings below. The mine is well ventilated and is equipped with electric lights.

The Pilares orebody is one of the largest in the world and is comparable, in many respects with that of the Rio Tinto. Ore reserves developed are estimated as sufficient for 5 years' continuous production, at 2,000 tons daily, and only about 60% of the ground above the 7th level has been opened, leaving 40% for later development. Company is reported, 1913, to plan deepening the 3 shafts from 1,000 to 1,500', connecting on that level by

drifts as the orebody shows no decrease in value at 110' depth. The Guadalupe is to be the main working shaft.

Mining equipment includes new electric hoists and a 25-drill air compressor. There is an emergency steam plant at the mine having 2 boilers held in reserve in case of accident, but electricity is used throughout.

The power plant, at Nacozari, includes a plant, built 1908, having four 435-h. p. Stirling water-tube boilers, equipped with Green fuel economizers, Foster superheaters and Rooney stokers, burning New Mexican coal, having a 196' reinforced concrete stack. The plant has three 1,000-kw. Curtis turbo-generators giving a 6,600-volt current, and an auxiliary 50-kw. steam turbine generator set is used as an exciter. Current is transmitted at 6,600 volts to the mine and mill and at the mine is stepped down to 230 volts for the pumps, while the hoists and electric locomotives use a 250-volt direct current. An old gas engine plant is described Vol. X.

The mine is connected with the mill by a 6-mile 20"-gauge railway, making a considerable detour to avoid bad grades. Rolling stock includes four 60-ton locomotives and twenty 30-ton Ingolsby steel side-dumping cars.

The 2,000-ton concentrator, designed and built by H. Kenyon Burch, at a cost of about \$1,000,000, is one of the most complete and efficient in existence. The mill is in 2 sections, both of steel frame, on concrete foundations. All elevators and tanks in the mill are of reinforced concrete and all launders for concentrates and tailings are below the floor.

The crushing plant receives ore from the mine in 6,000-ton bins, whence it is fed by 2 automatic ore feeders, of special design, to grizzlies, with bars set $2\frac{1}{2}$ " apart, oversize going to a No. 8 gyratory crusher, and undersize to a belt-conveyor, meeting material from the crusher, and going by belt conveyor to two 4x10" manganese trommels, with $1\frac{1}{8}$ " perforations. Undersize from the trommels goes to belt conveyors and oversize from the trommels goes to No. 5 gyratory crushers, breaking the material to 1" cubes, which joins the material from the trommels and is sent by belt conveyors to 4,000-ton storage bins.

Each unit of the mill is equipped with 6 coarse and 12 fine jigs, 3 sets of rolls, Swain classifiers, Callow screens, 44 Wilfley tables and 72 Johnson vanners. From the storage bins the ore is fed by a portable ore feeder to a belt conveyor, passing over an automatic weighing machine and sampler delivering it to an 18-mm. trommel. This trommel screens the ore, the coarse pieces going to bull jigs and undersize to 11-mm. trommels; the latter feed oversize to coarse jigs and undersize to 7-mm. trommels. These trommels in turn feed oversize to intermediate jigs and undersize to 4-mm. trommels, whose oversize goes in its turn to 2-mm. trommels; oversize from latter goes to fine jigs. The undersize from the 2-mm. trommels goes to 22-mesh Callow screens and thence to Wilfley tables handling oversize and undersize.

Slimes from the Wilfleys go to the vanner settling tanks and mid-llings from the Wilfleys go to Chilean mills by elevators. Tailings from the bull jigs, coarse jigs and intermediate jigs go to either of 3 sets of 42x16" rolls, then by elevator to the mixing-box at the head of the trommels. Tailings from the fine jigs go to dewatering machines, and overflow from dewatering machines goes to vanner settling tanks, dewatered material going to the jig tailings bin and thence to Chilean mills, crushing to pass a $2\frac{1}{2}$ -mm. screen and thence to Callow screens of 22-mesh. Product is a concentrate of about 12% copper tenor, about 85% of the assay value being saved.

An aerial tramway carries tailings from the concentrator to a dump on the hillside, far above the river level.

Water is pumped from a well sunk at the side of the river by 1-triplex and 3 Worthington pumps, of 500 gals. capacity per minute, to 500,000-gal. tanks at the mill. Wash water from the concentrates is settled and re-used. A large dam 3 miles east of Nacozari, 90' in height, stores water sufficient for 2 years steady operation of the mill.

The old 600-ton concentrator, in 2 sections, fully described Vol. IX, is out of commission, but is by no means antiquated or inefficient, being available for use on immediate notice.

The smelter, described Vol. IX, has been cold since Sept., 1904, concentrates and ore being shipped to the Copper Queen smelter, at Douglas.

Equipment includes a complete plant of shops and warehouses, including a good brick machine shop. The company built and owns the entire town of Nacozari, and a town at the Pílares mine, with a considerable number of comfortable houses, and a school. At Nacozari the company maintains both English and Spanish schools for the children of employes, a well-equipped hospital and a free library, and amusement hall. The company maintains large stores and conducts a profitable mercantile business, both at Nacozari and Pílares. At Nacozari 2 saloons are permitted, 1 for Mexicans and 1 for other races. The company also owns and manages a hotel, water works, an electric light plant and a 10-ton ice plant.

Forces normally are 1,300 men at the mine and mill, of which the great majority are Mexicans, with a few Japanese, no American labor being employed at the mine aside from shift-bosses and timbermen. Mining is performed under contract at 7 to 11 pesos per foot, and the larger part of the tramming is done by contract also, the mine proper employing about 200 miners, 80 carmen and 75 contractors.

Recent production has been as follows: 10,160,016 lbs. fine copper in 1905; 12,714,726 lbs. in 1906; 9,640,390 lbs. in 1907; 15,522,580 lbs. in 1908; 25,011,838 lbs. in 1909; 22,681,472 lbs. in 1910; 25,512,658 lbs. in 1911 and 32,080,099 lbs. in 1912. The Moctezuma is one of the world's really great copper mines and the management is of the best.

MOCTEZUMA MINE.

ARIZONA

Property near Globe, Ariz. Mrs. L. C. Woods and Mrs. Ike Elliott, owners. Mine is opened by a 75' shaft, showing a 2' vein of black sulphides of about 3.5% copper tenor.

MOCTEZUMA MINING CO.

MEXICO

Office: San Antonio, Tex. Mine address: Charcas, San Luis Potosi, Mex. Otto Wahrmund, pres.; A. L. Tuttle, supt. Property shows chalcoppyrite ore, estimated to average 4 to 5% copper, with small silver values. Mine idle since 1907 and company dormant.

MODERN COPPER MINING CO.

ARIZONA

Office: 1 Waverly Place, Utica, N. Y. Mine office: Bisbee, Cochise Co., Ariz. Jeremiah C. Breen, pres.; Milton Harlan, sec. and mgr.

Lands, 28 claims, unpatented, about 500 acres, at the northwestern end of Tombstone canyon, in the Warren district, showing 5 fissure veins carrying carbonate and sulphide ores, of which 1 vein, slightly developed, is claimed to give ore with average assay values of 7% copper, 10% lead, 14 oz. silver and 1 oz. gold per ton. Development includes shafts of 30' and 100' and a short tunnel, latter planned to strike a vein showing a gossan outcrop. Equipment includes a hoist and 6-drill air compressor. Closed down since 1910. Property considered of very speculative value.

MODERN SMELTING REFINING CO.**COLORADO**

Idle several years. Works at Denver, Colo. W. H. Powell, pres. and gen. mgr., at last reports. Capitalization \$1,000,000, shares \$1 par.

Lands are at Utah Junction, 4 miles northeast of Denver, having a spur track connecting with several railways. The property is a custom smelter, including a sampling mill operated by a 100-h. p. motor. The smelter has 4,000-ton steel ore bins and a 300-ton Colorado Iron Works blast furnace, making matte. Equipment includes a 450-h. p. Burns-Kennicut boiler, with automatic stokers, a 150-kw. electric dynamo and Piqua blowers.

MOGOLLON GOLD & COPPER CO.**NEW MEXICO**

Office and mine: Cooney, Socorro Co., N. M. Thos. J. Curran, pres.; J. H. Seaman, vice-pres.; W. I. Cox, sec.-treas.; preceding officers, R. Brownell and R. P. Barnes, directors; C. H. Putman, mgr.; Geo. Millan, supt., and A. M. Howat mg. engr. Organized Sept. 12, 1901, under laws of New Mexico, capitalization \$1,250,000, increased, 1910, to \$3,000,000, shares \$1 par. Bonds, \$350,000 authorized; \$305,000 issued. The property is operating under bond and lease to C. H. Putman Engineering Co., California.

Lands, 26 claims, partly patented, 480 acres, including the Cooney, Peacock, Little Charlie, Independence and Fluoride groups, sometimes known as the Silver Bar mine, in the Cooney district of the Mogollon mountains, 85 miles northeast of Silver City, the nearest rail point. The property shows porphyry and andesite, carrying the Little Fanny fissure vein of 5 to 10' average width, with a paystreak of about 3' average and 30' claimed maximum width, having numerous narrow feeders, some of which carry high gold values. This company and the Socorro Mining & Milling Co. are operating on this vein, and with a lateral development of 3,000' are said to be producing \$3,000 per day, 1913. Ores include slightly auriferous and strongly argentiferous chalcopryrite, bornite and chalcocite, claimed to carry increasing silver values at depth, and the east vein has been said to show native copper at depth of 600'. The Cooney and Peacock mines are said to have produced \$1,250,000 worth of ore in the past. The Cooney group of 9 claims has a 780' two-compartment main shaft. The Peacock mine, 1,500' from the Cooney, has a 400' shaft and is connected with the Cooney by drifts on several levels. The Little Charlie mine has shafts of 350', 225' and 200', the main shaft being 250' below the tunnel. There are also various tunnels on the several groups.

Equipment includes a 30-h. p. crude oil engine, an electric hoist, air compressor and necessary mine buildings. The mine shipped 20 to 30 tons daily in the summer of 1913.

The new management has shown ability and made creditable progress in development and, considering the 85-mile haul to a railway, deserves credit for its efficient operations.

MOHAWK MINING CO.**MICHIGAN**

Office: 15 William St., New York. Mine office: Mohawk, Keweenaw Co., Mich. Mill office: Gay, Keweenaw Co., Mich. Jos. E. Gay, pres.; J. Wheeler Hardley, sec.; John R. Stanton, treas.; preceding officers, Wm. A. Paine and Fred Smith, directors; Theo. Dengler, supt.; John Trevarrow, Jr., mg. capt.; F. Wm. Hartmann, engr.

Organized Nov., 1898, under laws of Michigan, capitalization \$2,500,000, shares \$25 par; paid in, \$18.50. Dividends were \$5 in 1906; \$9 in 1907; \$2.50 in 1908; \$3 in 1909; \$2 in 1910; \$1.75 in 1911; \$3.50 in 1912; \$5 in 1913, a total of \$3,175,000. Boston Safe Deposit & Trust Co., registrar; American Trust Co., Boston, transfer agent. Annual meeting, last Tuesday in March.

Lands, 800 acres, in an irregular tract having its axis on the strike of the Kearsarge amygdaloidal bed, in Secs. 27, 28, 33 and 34, T. 57 N., R.

32 W., about 4 miles northeast of Calumet, with the Ahmeek and Seneca mines on the north and Ahmeek to the west.

The property carries the Kearsarge amygdaloidal bed. This formation ranges from 15 to 18' in average width, or about the same as at the Wolverine, and the upper workings carry about the same percentage of copper as in the Wolverine mine, but the lower workings are by no means so rich. The Kearsarge bed is crossed at approximately right angles by a number of narrow fissure veins, with nearly vertical dip, that are yielding a considerable amount of mass copper and in addition there are 3 cross-fissures carrying copper arsenides, including mohawkite, keweenawite, mohawk-whitneyite, and stibio-domeykite, the 2 former being peculiar to this district and first found in this mine. The fissures carrying mohawkite range 3" to 3' in width, well mineralized where crossing the amygdaloidal bed and for an indefinite but usually short distance on either side, the mohawkite and allied arsenides occasionally occurring massive, but commonly being disseminated in an arenaceous gangue. Values in the arsenides decrease with depth and production latterly has been small. There also are other cupriferous amygdaloidal beds in the stratified series that may be given attention later.

The mine is developed by 6 shafts, numbered from north to south, of uniform size, 8x18' inside of timbering, with solid cribbing through the overburden and with identical equipment. The skipways are laid with concrete stringers, which prove very satisfactory. The mine is equipped with Richmond electric signals and operates about 65 power drills. About 15,000' of new openings are made annually.

No. 1 shaft, about 1,500' south of the northern boundary, is bottomed at the 22nd level and is 2,250' deep. This shaft gave a good showing near surface, becoming poor with depth, but improving in the lower levels. No. 1 hoist, in the central power plant at No. 2 shaft, operates two 4-ton skips in counterbalance. No. 1 shaft has a combination shaft rock house, equipped with a 12x24" Nordberg engine and crushers.

No. 2 shaft is 2,000' deep. Like No. 1, it had a good showing near surface with impoverishment at depth, followed by improvement below the 12th level. The combination shaft rock house is similar to No. 1 in design and equipment. The power plant at No. 2 shaft, serving both Nos. 1 and 2, includes an engine house and boiler house of mine rock with redstone trimmings. Hoists are Nordberg double-conical-drum duplex-cylinder engines, good for 6,000' depth, each handling two 4-ton skips in counterbalance. The boiler house has 2 locomotive firebox boilers, with foundations for 3 additional boilers, and the engine house has 2 Ingersoll-Sergeant air compressors, of 40 drills aggregate capacity.

No. 3 shaft, 1,100' southwest of No. 2, is 1,600' deep, and is to be abandoned, as the ground tributary to No. 3 can be reached to better advantage through shafts Nos. 2 and 4. Equipment includes a shaft rock house similar to Nos. 1 and 2, and a Fraser & Chalmers geared hoist, good for 3,000' depth, operating 2-ton skips in balance.

No. 4 shaft, 1,300' southwest of No. 3, is 1,900' deep, developing good average ground from surface. Equipment includes a steel shaft rock house with 3 crushers and a steam hammer. The engine house has a Nordberg double-conical-drum hoist, good for 6,000' depth. The central compressor plant, at No. 4, has a 60-drill Nordberg air compressor and a 60-drill Ingersoll-Sergeant cross-compound 2-stage air compressor, with steam cylinders of 22" and 46" diameter, and air cylinders of 27¼" and 42¼" diam., with stroke of 48", having a piston efficiency of 5,260 cu. ft. of free air per minute, compressed to 70 lbs. pressure per square inch. The boiler house at

No. 4 has 5 locomotive firebox boilers and a 160' self-supporting brick-lined steel smokestack.

No. 5 shaft, 1,800' south of No. 4, is 1,400' deep and like the northern shafts gave an excellent showing near surface with impoverishment at depth, but is again improving in the lower workings. Equipment includes a standard shaft rock house and a Bullock hoist good for 2,000' depth.

No. 6 shaft, the southernmost and newest, is about 2,600' south of No. 5 and 2,600' from the Ahineek boundary, commanding about three-fourths of a mile of the strike of the Kearsarge bed under an area of about 160 acres, or approximately as much ground as the entire Wolverine mine. This shaft is located about 60' in the foot, is 1,100' deep, and can be sunk to a maximum of 4,000'. The shaft is concreted for a depth of 90' from the collar, and the first level opened at 213' corresponding with the 4th level in the older workings of the mine, is known as the 4th level, there being no first, second or third levels in this shaft. The bed in No. 6 shows an average width of about 17', and owing to the sharper pitch of the bed levels are only about 90' apart. Equipment of No. 6 includes a 45x86' steel-frame power house, a steel shaft rock house, Nordberg hoist, with 24x60" duplex cylinders, good for depth of 4,000', and a 20-drill Ingersoll-Sergeant air compressor.

Buildings include a commodious 2-story office, a well equipped hospital, machine shop, smithy, combination carpenter shop and warehouse, 2 changing houses and numerous dwellings for employes. A complete telephone system connects the principal underground stations and surface works.

The mine and mill are served by the Mineral Range railway.

The mill, near the mouth of the Tobacco river, on Traverse bay, Lake Superior, opposite the mill of the Wolverine, is 178x206' in size, of steel frame sheathed with iron, on foundations of sandstone quarried from the company's own land. A steel trestle, 350' long and 50' high, leads into the mill, loaded cars being pulled up the incline by a winding engine. The mill has 4 stamps, all compounded, giving a daily capacity of 2,800 to 3,000 tons. The mill has a Chilean mill and 3 sets of auxiliary crushing rolls, with fixed bearings, to reduce oversize material from the mortar boxes of the heads, this averaging 20 to 25% of rock stamped. Mineral from the wash discharges automatically and is sluiced into the basement, where shoveled into 1½-ton mineral cars, having 14-mesh perforated steel bottoms that allow the draining out of water, after which the cars are weighed, then lifted by a cage elevator and dumped into bins. The bin house has 4 compartments, each with cement floor and steam-pipes underneath, for drying the remaining moisture from the wash. The mineral is taken from the bin house, in self-dumping steel mineral cars to the Michigan smelter at Houghton for reduction. Tailings from the mill are de-watered, then raised by bucket elevator, and stacked by belt conveyor, some distance from the mill.

The boiler house has four 250-h. p. Stirling water-tube boilers. Water for both the Mohawk and Wolverine mills is furnished from a joint pump house, standing near the Tobacco river, from which water is taken. The pump house has a 20,000,000-gal. triple expansion Snow pump, supplemented by a 9,000,000-gal. Nordberg pump, giving an ample water supply for both mills.

A 30x300' wharf, on Traverse bay, a short distance from the mill, with 14' of clear water alongside, is fitted with coal hoists and storage sheds, ample for the needs of both mills.

Yield of fine copper, per ton of rock stamped, averaged 15.79 lbs. for the decade ended 1912, and for the first half of 1913 was about 16 lbs.

Costs, plus construction, per ton of rock stamped, were \$1.92 per ton in 1903; \$1.44 per ton in 1908, and \$1.47 in 1912. Cost of finished copper, marketed, including construction, was 11.75 cts. per pound in 1907; 10.75 cts. in 1908; 11.20 cts. in 1909; 11.44 cts. in 1910; 10.39 cts. in 1911; 10.61 in 1912.

Production has been as follows: 160,897 lbs. fine copper in 1901; 226,824 lbs. in 1902; 6,284,327 lbs. in 1903; 8,149,515 lbs. in 1904; 9,387,614 lbs. in 1905; 9,352,252 lbs. in 1906; 10,107,266 lbs. in 1907; 10,295,881 lbs. in 1908; 11,248,474 lbs. in 1909; 11,412,066 lbs. in 1910; 12,091,056 lbs. in 1911; 11,995,598 lbs. in 1912. The Mohawk, while a much lower grade mine than was anticipated at the beginning, is a fine property with an assured future and has the benefit of a strong, honest and thoroughly economical and competent management.

MOLINA & SANGINETTI MINING CO.

ARIZONA

Address: J. M. Molina, Yuma, Ariz. Mine near Wenden, Yuma Co., Ariz. Lands, 5 claims, known as the Torres mine, about 7 miles northwest of Wenden, in the Harcivar mountains. The mine has shafts of 75', 100' and 125', and a 125' tunnel, all workings showing slightly auriferous copper ore of good average assay tenor. Property idle several years.

MOLLIE GROVES MINING & MILLING CO.

COLORADO

Office: 328 New York Life Bldg., Kansas City, Mo. Operating office: 420 Ernest & Cranmer Bldg., Denver, Colo. Mine office: Parshall, Grand Co., Colo. L. F. Fue, pres.; Chas. F. Dehner, vice-pres.; J. F. Johnson, sec.; P. B. Austin, treas.; O. M. Groves, gen. mgr., at last accounts. Organized March 4, 1909, under laws of Colorado, capitalization \$2,000,000, shares \$1 par.

Lands, 11 claims, unpatented, 114 acres, about 6 miles northwest of Parshall. Property shows granite and schist, carrying 5 orebodies of 3 to 16' reported average width, of which the main vein of 16' average and 30' maximum width is reported to have a 6' central paystreak carrying gray copper ore with copper stains and copper sulphides on either side. Ores are mainly chalcocopyrite and chalcocite, assays averaging 12% copper and \$7.50 gold per ton. Development is by 11 pits and shafts, of 10 to 55' depth, and 5 tunnels of 125', 170', 200', 80' and 40', with 703' of workings. Two mill tests from surface ore returned 7.8 and 7.9% copper. Property was not regarded favorably by the late Horace J. Stevens, owing to its alleged preposterous claims.

MONARCA COPPER CO.

MEXICO

Address: Hermosillo, Sonora, Mex. Property, 50 miles northwest of Carbo, shows copper deposits in limestone near porphyry intrusions. Idle since 1910.

MONARCH MINE.

MONTANA

Property, near Elliston, Powell Co., Mont., shows fissure veins in andesite intruded by quartz-monzonite carrying galena, blende, pyrite and arsenopyrite. A 3 to 5' vein of copper sulphide ore yielded considerable copper in the past, but has not been worked recently and present efforts are directed toward the exploration of other veins.

MONARCH MINING & SMELTING CO.

ARIZONA

Office: P. O. Box 13, Macon, Ga. Mine office: Wickenburg, Maricopa Co., Ariz. Dr. Jas. T. Ross, pres.; H. G. Leak, vice-pres.; C. E. Kernoghan, sec.; preceding officers, H. L. Abbott, J. C. Edwards, Hon. Rhodes Brown, Jos. H. Napier and W. A. Chapman, directors. J. C. Carlisle, supt.; A. D. Akin, mgr. and cons. engr.; D. S. Jones, purch. agt. Organized Aug., 1904, under laws of Arizona, capitalization \$1,000,000, shares \$1 par, nonassessable; issued, \$736,840 In Oct., 1913, the company authorized an issue of \$100,000

first-mortgage bonds, \$50,000 issued for cash to be used for mine development.

Lands, 6 claims, patented, 100 acres, known as the Ryland or Three, Black Butes group, in the Black Rock or White Picacho district, 9 miles southeast of Wickenburg, show diorite and schist carrying oxidized ores changing at shallow depth to chalcopyrite and occasional bornite, assaying 2 to 20% copper and estimated by management to average 1 to 3 oz. silver and \$3 to \$15 gold per ton. Development is by several shallow shafts and tunnels of 600' and 360', with about 1,500' of underground workings and several thousand feet of surface trenching.

Equipment includes a 50-h. p. distillate engine, 5x8" Rumsey triplex pump, and a 4-drill Sullivan air compressor. There are about 26 buildings, all owned by the company. Water is taken from the Hassayampa river through 7 miles of 4" pipe. The mill, of 100 tons rated capacity, has a 11x15" Dodge crusher, Hartz jigs, rolls, 2 concentrating tables, 2 vanners, slime table and 3 buddles. The mill was burned and mine shut down in summer of 1913, but operations resumed in October.

MOND NICKEL CO., LTD.

ONTARIO

Secretary's address: Hugh Hughes, 39 Victoria St., London, S. W., England. Mine office: Victoria Mines, Algoma, Ont. Works office: Clydach, Glamorganshire, Wales. Sir Alfred Mond, M. P., chairman; Dr. Bernhard Mohr, gen. mgr.; Sir Andrew Noble, Bart., K. C. B., F. R. S., Saxton W. A. Noble, Emile S. Mond, Robt. L. Mond, Dr. Carl Langer, Robt. Mathias and Sir Edmund Walker, C. V. O., directors. Oliver Hall, supt.; A. Sharp, supt. Garson mine.

Organized Sept. 20, 1900, under laws of Great Britain, capitalization £600,000, increased, July, 1908, to £850,000, in £500,000 cumulative 7% preferred shares, £5 par; £300,000 ordinary shares, £1 par, and £50,000 deferred shares, £1 par; total issued capital, £750,000. For fiscal year 1913, profits were £201,102. Dividends of 7% have been paid regularly, on the preferred shares, and dividends on ordinary shares have been as follows: 6% in 1905; 10% in 1906; 12½% in 1907; 15% in 1908, 1909 and 1910; 16¼% in 1911 and 1912; 21¼% in 1913. Reserve fund, £220,000. Cash balance, Sept., 1913, £49,525. Net profits were £111,320 in 1909; £114,107 in 1910; £140,803 in 1911 and £232,429 in 1912. Dividends on deferred shares were 18% in 1906; 33% in 1907; 48% in 1908, 1909 and 1910; 52¼% in 1911 and 1912; 80½% in 1913.

Lands, 7,050 acres, freehold, and about 1,550 acres leasehold, in the Sudbury district, including the Worthington, Garson, Victoria and Cochran-McVittu mines, and a smelter site at Coniston, 10 miles east of Sudbury, alongside the Garson mine. The properties carry nickeliferous and cupriferous pyrite, in norite gabbro, averaging about 1.75% copper and 2.25% nickel.

The Garson mine from which the company obtains most of its ore has 2 lenses of ore about 100' apart known as the north and south deposits, developed by a shaft, worked to the 700' level and proven by diamond drilling to 1,300'. The ore encloses great masses of greenstone and it dips southeast under the norite mass, supposedly as a result of faulting.

The Victoria mine, opened 1899, the principal property, carries 2 columnar bodies of pyrrhotite and chalcopyrite, about 169' apart, with E.-W. strike and dip of about 70° E., connected by stringers in schistose diorite near a granite contact. The orebody has been proven for 1,600' in depth. The mine has a 1,600' three-compartment vertical shaft, 4x12' inside of timbers, with 18 levels opened, the orebodies maintaining their size and grade in the bottom workings.

The Cochrane-McVittu mine has a fraction of the great Frood deposit, the world's greatest nickel copper orebody. This property, already drilled, will be developed by an 800' shaft in 1914.

Equipment at the Garson and Victoria mines is complete and up-to-date.

The power plant on the Wahnapiatae river furnishes power to both mines and the smelter.

The old smelter, near the mines, has been abandoned, and a new and larger smelter, erected 1912, was blown in May 15, 1913. The new smelter, of 1,000 tons maximum daily capacity, makes a high-grade nickel-copper matte which is sent to the refinery at Clydach, Wales.

At the Clydach refining works, in the Swansea valley, the copper-nickel matte from the smelter is dead-roasted and treated with dilute sulphuric acid, which permits the extraction of about 65% of the copper and 2% of the contained nickel. The residue, after drying, assays 45 to 60% nickel, and is treated in charges of 500 kgs. with water-gas, in a reduction tower, at a temperature of about 300° C. This tower has shelves and the ore is moved from shelf to shelf by automatic rakes, the lower shelves being cooled. After treatment in the reduction tower the charge is transferred to a volatilizing tower and treated with carbon monoxide at a temperature of about 100° C. The residue therefrom is returned to the reducing tower and the charge goes forward and back between the 2 towers for 10 to 15 days, and when 60% of the nickel has been volatilized, as nickel carbonyl, the residue of the charge is returned to the roasting furnace. The nickel carbonyl is treated in a decomposing apparatus, wherein the metal is recovered in granules, assaying 99.4 to 99.8% nickel, and the copper is turned out as bluestone. The mine output for 1911 was 163,352 tons and 117,658 tons in 1912.

Production is not reported by the company, but unofficial estimates place the annual output at about 4,000,000 lbs. fine copper and 5,000,000 lbs. nickel, with a possible maximum production of 10,000,000 lbs. copper and 15,000,000 lbs. nickel.

MONITOR CONSOLIDATED COPPER MINING CO.

IDAHO

Office: 1325 Dean Ave., Spokane, Wash. Mine office: Saltese, Missoula Co., Mont. Otis Hill, pres. and mgr.; L. B. Hill, H. M. Casey, H. F. Samuels and E. P. Spaulding, directors. Capitalization \$1,000,000, shares \$1 par. Paid a dividend, 1907, of \$9,500. Supposedly is controlled through ownership of 51% of stock issue by Monitor Development Mining Co.

Lands, 10 claims, patented, 6 miles west of Saltese, being the first copper location in the eastern Cœur d'Alenes. A fissure vein of 10 to 30' width, with N.-E. strike and nearly vertical dip, has a paystreak carrying mainly massive chalcopryrite ore, balance of vein carrying disseminated chalcopryrite, mainly of concentrating grade. Occasional native copper is found. Shipments of selected ore returned 17 to 22% copper, 7 oz. silver and \$1.50 to \$2 gold per ton. The bottom levels of the mine, which is quite wet, show good ore. Development is by a 700' two-compartment vertical shaft and survey was made, 1913, for a 5,000' crosscut tunnel, starting from the Puget Sound Railway track, to develop this, the St. Lawrence and the Richmond properties, which show high-grade copper ores.

Equipment includes a steam plant with 50-h. p. and 60-h. p. boilers, a good hoist and a 3-drill air compressor. Property idle since equipment was destroyed in big forest fires of 1910-11. Work will be resumed in Nov., 1913.

MONO-BALTIC MINING & SMELTING CO.

COLORADO

Idle. Office: Red Mountain, Ouray Co., Colo. Works office: Ironton, Ouray Co., Colo. E. W. Averill, pres. and treas.; Frank Woodbury, vice-

pres.; D. W. Jackson, sec. Organized 1907, under laws of Colorado, capitalization \$5,000,000, increased, 1909, to \$7,500,000, shares \$10 par.

Lands, about 180 acres, known as the Saratoga group, in the Red Mountain district, showing fissure veins and contact deposits having large bodies of oxidized silicious ores of low copper tenor, but carrying high silver values, with some gold, also bornite and chalcopryrite associated with pyrite. A complete sampling of the mine, with 500 assays, is reported to have given an average of 3.5% copper and 12 oz. silver per ton, with small gold values.

Development is by 4 shafts, deepest 140', and by tunnels of 120', 700', 1,000' and 1,100', with about 2 miles of workings. There are necessary mine buildings.

A smelter, planned to have been blown in July, 1909, was not in blast early 1913.

MONROE COPPER MINE.

ARIZONA

Address: John Curran, owner, Prescott, Yavapai Co., Ariz. Mine, once owned by the Monroe Consolidated Mines Co., long dead, is near the junction of Knapp gulch and Lynx creek, near Prescott. Property, formerly worked as a gold mine, has a gold vein and a 50' dike carrying copper ore on the 300' level.

Development work consists of various tunnels. Two car loads of ore carrying oxides and bornite are reported shipped in Oct., 1913.

MONTANA-ARIZONA COPPER CO.

ARIZONA

Address: W. D. Greenough, manager, Greenough Bros., Spokane, Wash. Mine address: Bouse, Yuma Co., Ariz. Lands, 26 claims, 520 acres, 30 miles north of Wenden, the nearest railroad station. Property is said to show 5 veins of 3 to 100' width, traceable 7,000', including a 3' vein carrying good gold values. Development is by a 300' two-compartment shaft and a considerable number of trenches. Equipment includes a 60-h. p. gasoline hoist. Idle several years.

MONTANA-BINGHAM CONSOLIDATED MINING CO.

UTAH

Office: 66 West Broadway, Salt Lake City, Utah. Mine office: Bingham Canyon, Salt Lake Co., Utah. W. E. Hubbard, pres. and gen. mgr.; G. G. Schliep, vice-pres.; H. A. Kornick, sec.; E. O. Howard, treas.; M. T. Miller, supt. Organized July, 1910, as successor of Bingham-Butte Consolidated Mining Co., capitalization \$1,500,000, shares \$1 par; issued, 783,764 shares. Debentures, \$200,000 at 6%, \$32,000 outstanding. Total assessments to date, \$18,164.

Property, 4 claims, patented, 60 acres, including the Puritan and Eddie groups, carrying the Quinn fissure, near the Starlus mine. Company was organized mainly for the purpose of driving a long tunnel known as the Montana Bingham, or Miller tunnel, which will be the main transportation and drainage tunnel and eventually develop the eastern section of the camp, including the Fortuna, Keystone, Conger and other groups. The tunnel, planned to be driven 3,500', was 2,020' in length Sept. 15, 1913. This and several prospect tunnels disclose porphyry and quartzite, characteristics of the Bingham camp and the Upper tunnel exposes the Quinn fissure, samples from the first 50' of a 500' crosscut assaying 1.29% copper, the balance going much lower. The big tunnel intersects several fissures, including the Front vein, about 25' wide, carrying an 18" paystreak said to assay 9% copper, 3 oz. silver and \$1 gold per ton.

MONTANA-CLINTON COPPER CO.

MONTANA

Office: Helena, Mont. Mine office: Ellington, Powell Co., Mont. E. H. Brandegee, pres.; W. K. Armstrong, vice-pres.; C. L. Friederichs, sec.-treas. and gen. mgr.; preceding officers, Wm. Pope, and C. O. Price, direc-

tors; John A. Friedrich, supt.; Arthur Ireland, mg. engr.; Fred Halroyd, purch. agt.; Goodall Bros., assayers.

Organized April 16, 1909, under laws of Montana, capitalization \$1,500,000, shares \$5 par, assessable; issued, 142,874; 55,000 shares outstanding, \$1.55 paid, last call being 15 cts., Nov., 1912. First National Bank, Laurium, registrar and transfer agent.

Lands, 7 claims, unpatented, 140 acres, known as the Julia group, on Telegraph creek, 8 miles south of Elliston. Country rock is granite. There are numerous veins, the 1 under development being 14' wide with a pay-streak ranging from 6" to a maximum of 4', developed for 500'. Ores are mainly galena, sphalerite and tetrahedrite, with a high silver content. Surface ores carried considerable gold, decreasing with depth, while the silver content has increased. Development is by a 210' shaft and a 600' tunnel, with ore for 500' in length of 600' of workings. Ore reserves estimated at 2,000 tons, said to average 4% copper, 4% lead, 8% zinc, 35 oz. silver and \$10 gold per ton.

Equipment includes a new 80-h. p. boiler, a 30-h. p. steam hoist and 3-drill Rand air compressor, and there are about 10 buildings. Continuous development is planned. Company planned 300' new drifting, west, and 300' crosscutting south, also sinking shaft to 300' level.

Production from June 1, 1911, to June 1, 1912, was 1,258 tons of copper-lead ore carrying gold and silver, yielding \$17,870 net smelter returns and for 8 months ending Feb. 1, 1913, was 969 tons, shipped to Washoe smelter, returning \$31,335.

MONTANA CONSOLIDATED COPPER CO.

MONTANA

Office: 46 Wall St., New York. Capitalization \$1,000,000. Property includes the Comet and the Grey Eagle mines, about 7 miles northwest of Boulder, Jefferson Co., Mont., both idle several years, except for work done by leasers. Ores are mainly galena and sphalerite with associated pyrite and chalcopryrite, and the Comet is popularly credited with having yielded a gross output of \$10,000,000. See Vol. IX.

MONTANA CONSOLIDATED MINING CO.

UTAH

Office: 531 Atlas Blk., Salt Lake City, Utah. Mine office: Ophir, Tooele Co., Utah. Thos. F. Kelly, pres.; Edw. McGurrian, sec., at last accounts. Organized 1902, under laws of Utah, capitalization \$400,000, shares \$1 par, assessable; fully issued. Lands, 12 claims, patented, showing argentiferous copper and lead ores, developed by a 300' shaft, with about 2,200' of workings. Presumably idle.

MONTANA COPPER & GOLD MINING CO.

MONTANA

Is controlled through ownership of practically entire stock issue, by Sonora Central Mines Co., which see.

MONTANA COPPER SILVER CO.

MONTANA

Address: E. R. Purnell, superintendent, Helena, Mont. Mine in Scratch Gravel hills, Lewis & Clark Co., Mont., 8 miles from Helena. Property shows quartz veins in quartz-monzonite, carrying ores with pyrite and chalcopryrite with gold-silver values. Development consists of a 370' shaft, sinking to 500' in July. Equipment includes hoist and company plans buying compressor.

MONTANA COPPER & SILVER MINING CO.

MONTANA

Letters unanswered at Clancey, Jefferson Co., Mont. Capitalization \$2,000,000, shares \$10 par. Lands, 4 claims, in Lump gulch, 2 miles from Clancey, opened by the 275' Clara Bell shaft, lower drift of which shows tetrahedrite assaying 60 to 400 oz. silver per ton. Shut down several years and company presumably dead.

MONTANA CORBIN COPPER CO.**MONTANA**

Reorganized as Corbin-Copper King Mining Co., which see.

MONTANA-ILLINOIS COPPER MINING CO.**MONTANA**

Office: 450 Phoenix Blk., Butte, Mont. Mine address: Jefferson Island, Madison Co., Mont. J. W. Brown, pres.; Benj. W. Wilson, sec. and gen. mgr.; W. Y. McCormack, treas.; preceding officers, L. H. Stanhope, Alex. Mackel and J. C. Oberon, directors. Joseph Pyle and Hugh McLeod, cons. engr. s.; Arthur Goff, mine supt. Organized 1907, under laws of Montana, capitalization \$2,000,000, shares \$1 par, nonassessable; issued, \$1,954,000. Bonds, \$30,000 authorized, at 12%; issued, \$21,000. Annual meeting, first Thursday in July.

Property, the Bismark mine, is 20 miles south of Jefferson Island, in the Ruby mountains. Holdings comprise 11 quartz claims, 2 patented, three 5-acre mill sites, a water right and 320 acres of placer ground, contested by the forest reserve, giving total holdings of 550 acres, including part of the former holdings of the Bismark Copper Mining Co. Claims show granite and gneiss carrying 3 fissure veins, under development, with N.-W. strike of about 4' average width. Veins carry chalcopyrite and bornite estimated by management to average about 5% copper, 2 oz. silver and \$1 gold per ton. Mine has tunnels of 400', 200', 500' and 1,900', with about 3,000' of workings.

Equipment includes a 5' Pelton wheel and a 10x12" two-drill air compressor. There are 12 mine buildings. A concentrator, under construction, 1913, is to have a Blake crusher, Chilean mill, rolls, 6 Wilfley tables, 4 vanners and a slime table.

MONTANA ORE PURCHASING CO.**MONTANA**

Address: F. Aug. Heinze, 74 Broadway, New York. The mining property of the company was sold, 1906, to Butte Coalition Mining Co., and apparently the company now owns nothing but sundry share interests. Fully described Vol. V.

MONTANA OREWAY MINING CO.**MONTANA**

Office: 501 Postal Telegraph Bldg., Chicago. Mine office: Briston, Beaverhead Co., Mont. W. P. Jahnke, pres. and gen. mgr.; Fred W. Scott, sec.; J. D. Rankin, treas. Organized 1898, under laws of Arizona, capitalization \$1,000,000, shares \$1 par; issued, \$900,000.

Property, 5 claims, patented, 100 acres, and a 25-acre mill site, known as the Straight Tip group, in the Big Hole basin. Claims show several fissure veins averaging 10' thick in quartzite and contact deposits between quartzite and serpentine. Opened by a 2,350' tunnel driven to cut a mineralized diorite dike carrying copper oxide ores, with lead and small silver and gold values.

Equipment includes a 35-h. p. steam plant, with 1-drill air compressor, and there are 6 small buildings.

MONTANA SCOTCH BONNET COP. & GOLD MG. CO.**MONTANA**

Idle. Office: 603 Jamieson Blk., Spokane, Wash. Mine office: Cooke, Park Co., Mont. S. A. Gibson, pres. and gen. mgr.; C. E. Mallette, sec.-treas. Organized March, 1902, under laws of Washington, capitalization \$300,000, shares 10 cts. par, nonassessable; fully issued.

Lands, 17 claims, partly fractional, 200 acres, in the New World district, 65 miles from a railway. Development is by tunnel with about 1,500' of workings developing oxidized and sulphide ores of lead and copper, giving small copper assays, an average of 3.7% lead, 4 to 5 oz. silver and \$3.10 gold per ton. Mine closed, awaiting transportation facilities. Company reported to have refused an offer of \$180,000 for 60% of its stock, made by the American Smelting & Refining Co., 1911.

MONTANA SMELTING CO.**CALIFORNIA**

Address: Room 613, Oakland Bank Bldg., Oakland, Cal. Incorporated Jan., 1912, under laws of California, by Geo. B. Merrell, True Van Sickle and Geo. E. De Golia, all of Oakland, and corporate articles filed at Helena, Mont. Capitalization \$100,000. California franchise forfeited Nov., 1912, for non-payment of license tax.

MONTANA-STATES MINING CORPORATION.**MONTANA**

Office: Bailey Blk., Helena, Mont. Mine office: Alhambra, Jefferson Co., Mont. R. A. Bell, pres. and gen. mgr.; Edward Horsky, sec.-treas.; E. H. Wilson, engr. Organized May, 1911, under laws of Montana, capitalization \$5,000,000, shares \$5 par; issued, 80,000 shares.

Lands, 38 claims, partly patented, 700 acres, including the Fairview group of 30 claims, in the Warm Springs district, 6 miles from a railroad. Country rock is a quartz monzonite of the Boulder batholith, cut by rhyolite dikes and showing quartz veins with mineralization along the walls.

Development is by numerous shallow shafts, and short tunnels, with about 1,600' of openings, opening a number of small veins. Ores are mainly galena, sphalerite and tetrahedrite, with a chalcedonic quartz gangue reported by the management to carry up to 22% copper, 10% lead, 8% zinc, 16 oz. silver and \$16 gold per ton.

Mine has no equipment but electric power is planned. Property considered promising.

MONTANA YERINGTON CO.**NEVADA**

Geo. Wingfield, Goldfield, Nev.; H. S. Brady and C. W. Geddes, mgr., chief owners. Fred Siebert, cons. engr. Mine address: Yerington, Lyons Co., Nev. Property, a group of claims said to show orebodies in porphyry, unlike other Yerington deposits.

Development consists of a 300' shaft sinking to 500' with levels at 160' and each 100' interval. The 160' level east was run 500' to daylight, making a main working tunnel. The 2nd level opened has 200' crosscut to vein, showing a wide contact with much low-grade and streaks of high-grade ore. A face 25' wide is said to show commercial ore from which 100-ton shipments have returned 7% copper.

MONTE RICO MINING & MILLING CO.**NEW MEXICO**

Office: 428 Washington Trust Bldg., Washington, Pa. Mine office: Lordsburg, Grant Co., N. M. Lawrence R. Boyd, pres.; F. B. Theakson, vice-pres.; Jas. V. Boyd, sec.-treas. Organized under laws of Arizona, capitalization \$500,000, shares \$1 par, nonassessable.

Lands, 9 claims, 120 acres, on Lee's peak, in the Pyramid mountains, Virginia district, 4 miles southwest of Lordsburg.

Property shows diorite cut by andesite, and there is said to be a dike 100 to 200' wide mineralized throughout and forming the center of a network of veins. Ores at and near surface carry azurite and malachite succeeded at depth by chalcopryite and there are also silver, lead and copper ores with small gold values.

The mine is reported to have upwards of 2,000' of workings, including shafts, tunnels and trenches, with ore in sight estimated by the company at 500,000 to 1,000,000 tons, which is doubted. The company's statement that its ores can be mined and milled at an expense of \$1.50 to \$2 per ton is also considered doubtful.

The prospectus of the company is replete with misinformation and untruths, and among other things states that "this formation, as well as the character of the ore, is identical with that found in the great copper mines of Bisbee, Globe, Jerome and Cananea," but as is well known, the orebodies of those localities differ greatly in occurrence. In view of the

many questionable statements made, and the unreasonably large profits promised in the prospectus, the company must be regarded with much suspicion.

MONTEREY MINING, SMELTING & REFINING CO., S. A. MEXICO

(Compania Minera, Fundidora y Afinadora, S. A.) Office and works: Monterey, Nuevo León, Mex. Juan M. Weber, general manager. Capitalization \$8,000,000, shares \$100 par.

Lands include the Ocampo and Santa Elena mines, at Mineral de la Mula, carrying gold, copper and lead ores; La Cruz y Anexas mines, at Pánuco de Coronado, carrying silver-lead and copper ores; the Cinco de Mayo group at Lampazos, Nuevo León, producing iron fluxing ores; and a mine at Naica, Chihuahua, Mex.

Company operates a lead smelter and silver-lead refinery, in direct competition with the American Smelting & Refining Co., at Monterey. The smelter also handles small quantities of copper, which is disposed of in the form of matte. Production during fiscal year, 1912, was 13,919,107 kgs. lead, 238,555 kgs. silver and 3,158 kgs. gold.

MONTEREY SMELTER.

MEXICO

See Monterey Mining, Smelting & Refining Co., S. A.

MONTEREY SMELTING & REFINING CO.

MEXICO

Works office: Monterey, Nuevo León, Mex. Is controlled by American Smelting & Refining Co., which see.

MONTEZUMA COPPER MINING CO.

ARIZONA

Property, 17 claims, a mile west of Miami, Gila Co., Ariz., sold, June, 1912, to the Southwestern Miami Development Co. Company paid dividend out of first payment of purchase money and is doing no mining work. See Vol. VII and IX.

MONTEZUMA MINING CO.

MICHIGAN

Address: Care Shelden-Douglass Estate, Houghton, Mich. Property consists of a number of building lots in the village of Houghton, covering the old Montezuma tract, the mineral rights in which were sold, 1912, for \$100,000, to the Isle Royale Copper Co.

MONTREAL SMG. & REDN. CO. OF CANADA, LTD.

ONTARIO

Office: 26 St. James St., Montreal, Quebec. Works near North Bay, Nipissing, Ont. R. J. Forget, pres.; L. J. Cartier, sec. Capitalization \$2,000,000, shares \$5 par.

Owens the North Bay smelter at Trout lake, 3½ miles from North Bay, said to have cost \$700,000, and designed primarily to reduce the argentiferous ores of the Cobalt district, but also planned to smelt copper ores. The plant includes a concentrator with ore bins and amalgamating mill, furnace and converter departments, power house, boiler house, machine shop, carpenter shop, laboratory and office, all principal buildings being of steel frame, sheathed with galvanized iron, on concrete foundations. The smelter was blown in Jan. 7, 1908, but did not prove successful and was soon blown out. Idle several years and property for sale.

MOON CREEK MINING CO.

IDAH0

Office: Wallace, Idaho. J. Peeper, president and general manager, at last accounts. Lands, 9 claims, 180 acres, about 2 miles up Moon creek from Osburn, with a good wagon road. The property has a 30" vein carrying ore assaying up to 9% copper and 20% lead, with small gold values, developed by a 165' shaft and a 675' tunnel. Equipment includes a 4' Pelton water wheel, working under a 185' head, with an auxiliary boiler, hoist, 4-drill Ingersol air compressor, and a small electric light plant. There are necessary buildings. Presumably idle.

MOONLIGHT MINE.**MONTANA**

Mine address: Copperopolis via Delphine, Meagher Co., Mont. John Weston, superintendent. Property, about 15 miles east of White Sulphur Springs, is developed by a 700' tunnel, showing a vein of silver-copper ore.

MOORE COPPER MINE.**IDAHO**

M. E. Mopre, owner, Edwardsburg, Idaho Co., Idaho. Property, the Moscow mine, or Moore Bonanza, has a big ledge said to be 150' wide of gold ore carrying small copper values.

MOOSE MINE.**COLORADO**

Henry M. Scott, owner, 111 Broadway, New York, N. Y. H. C. Bishop, supt., Alma, Park Co., Colo. Property has silver-lead-gold-copper ore in veins, opened by tunnels. Employs about 15 men when working.

MOQUI COPPER CO.**VIRGINIA**

Office: 20 Broad St., New York. Letter unclaimed at Reager, Rappahannock Co., Va. Geo. B. Wright, pres.; Josiah C. Pumpelly, vice-pres.; Morris F. Wood, sec.; Powhatan Weisiger, treas., at last accounts. Organized Feb. 12, 1907, as a reconstruction of Manassas-Gap Copper-Mines, Inc., capitalization \$1,500,000, shares \$1 par.

Lands, 700 acres, freehold, including about 400 acres of timber land, in Fauquier county, Virginia, 3 and 6 miles from 2 railroads, carrying 2 contact veins between Cambrian sandstone and Silurian slates, claimed to range 3 to 11' in width and to carry malachite, bornite and chalcopryrite, associated with a little native copper. Idle several years, and not regarded seriously.

MORAJESKI MINES.**ARIZONA**

A. and V. Morajeski, owners. Red Rock, Pinal Co., Ariz. Property, the Apache mine, 9 miles northeast of Red Rock, in the Owl Head district, is an old silver property, carrying a large andesite dike cutting granite and carrying zone impregnated with oxidized and sulphide ores of copper.

MORESBY ISLAND MINES, LTD.**BRITISH COLUMBIA**

Office: Vancouver, B. C. Mine address: Jedway, Queen Charlotte Islands, B. C. W. H. Leckie, pres.; A. Liddle, sec.-treas. Capitalization, \$500,000, shares \$1 par. Property is the Collison group of 3 claims, on Moresby island, also known as the Meal Ticket, Cash Box and Treasure Vault claims. Development is by tunnels and open cuts, showing assay values of 3.8% copper and \$5.60 gold per ton. Idle except for annual assessment work.

MORNING GLORY MINE.**ARIZONA**

Office and mine: Patagonia, Santa Cruz Co., Ariz. Chas. B. Wilson, owner and manager. Lands, 11 claims, 220 acres, 12 miles from a railway, in the Harshaw district of the Patagonia mountains, showing a 6' fissure vein in limestone and porphyry, carrying sulphide ore, estimated by owner to average 3% copper, 40% zinc, 3 oz. silver and \$2 gold per ton. Development is by 2 shafts of 80' and 200', with about 400' of workings, estimated by owner to give 50,000 tons of 3½% copper ore blocked out for stoping. Ore is hand-sorted. Equipment includes a small hoist. Production, 1912, was about 240,000 lbs. copper. Shipments planned to resume as soon as the Pioneer smelter resumes in 1913.

MORNING STAR MINE.**CALIFORNIA**

At Markleville, Alpine Co., Cal. Owned by Curtz Consolidated Mines Co.

MORRIN GROUP.**BRITISH COLUMBIA**

Is a gold-copper prospect on Valdez island, Comox district, about 120 miles north of Vancouver. Property embraces 5 claims on Granite bay, principal claims being the Grand Prix and Gold Thread, former having several open cuts, said to show a contact deposit between limestone and

diorite. Ore is mainly chalcopyrite. The Gold Thread claim, examined by Percy Williams, M. E., 1913, shows an irregular fissure of white quartz in diorite, carrying high values in gold.

MORSE CONSOLIDATED COPPER CO.

ARIZONA

Mine address: Box Canyon via Wickenburg, Maricopa Co., Ariz. F. J. Weber, superintendent. Lands, 6 miles from Wickenburg on the Hassayampa river, developed by tunnel, show copper ore said to average 3% copper, 10 oz. silver and \$5 gold per ton.

MOSCOW EXTENSION MINING CO.

UTAH

Office: Salt Lake, Utah. No trace of operations securable; Presumably defunct.

MOTHER LODE COPPER CO.

ARIZONA

Mine office: Prescott, Yavapai Co., Ariz. Organized 1907. Lands, 7 claims, 140 acres, in the Copper basin, 10 miles west of Prescott, showing an orebody between limestone and porphyry, said to give average assays of 12% copper and \$6 gold per ton. Idle.

MOTHER LODE COPPER MINES CO. OF ALASKA.

ALASKA

Office: 902 Lowman Bldg., Seattle, Wash. Mine office: Kennecott, Copper River district, Alaska. Jas. J. Godfrey, pres.; J. W. Robinson, vice-pres.; C. L. Warner, sec.-treas.; preceding officers, O. J. Hosford and B. L. Engelke, directors; Geo. E. Baldwin, gen. mgr. Organized under laws of Washington, with capitalization \$5,000,000, shares \$1 par.

Lands, 70 lode and placer claims, about 1,300 acres, including the Smith-Haglund-Sall group, on unsurveyed ground, adjoining the Bonanza mine, and 13 miles from the Copper River & Northwestern railroad.

The geological conditions at this property, according to Herman Keller, are similar to those of the Bonanza mine. The base of the mountain is formed of amygdaloidal basalt, highly altered and called the Nicolai greenstone. This is covered by thick beds of Chitina limestone, dipping north. The ore shoots occur in the limestone, and exploration has shown that contrary to general belief, the ore does not occur along the greenstone contact, but in a favorable bed 90' above it and then only in connection with the Bonanza fault, or shear zone. This shear zone, 20 to 24' wide, cuts both greenstone and limestone and the ore is found in chimneys and as irregular bunchy masses along the zone and as impregnations in the limestone walls. The ore consists of nearly pure glance with minor and unimportant amounts of covellite and of very little malachite, etc. Like the Bonanza ore it carries gold and silver.

Development is by 4 short tunnels, known as the South, Marvelous, North and Regal. Work for some time has been confined to drifting and crosscutting on the Marvelous claim, which with the Hero and Leviathan claims is considered the most important of the several groups.

The mine has no power equipment, but there is a 7,300' aerial tramway, connecting the Marvelous tunnel with the so-called Lower camp. Buildings include an office, boarding house, and several other log structures.

New work planned for 1914 includes a long working tunnel, 1,100' below the present workings on the Marvelous claim, and a small steam plant with air compressor will be erected. These improvements will cost \$150,000. Company has 500 tons of ore sacked for shipment, said to assay 74.68% copper and 15.4 oz. silver, being mostly copper glance.

Property has been fully and favorably reported on by Herman A. Keller, E. M., and by Arthur W. Jenks, and is a prospect of considerable merit.

MOTHERLODE COPPER MINING CO.

VIRGINIA

Idle. Office: 623-18 Broadway, New York. Joseph H. Morong, pres.

and gen. mgr., at last accounts. Organized Sept., 1902, under laws of New York, capitalization \$1,500,000. Property is the old Morong mine, at Virgilia, Halifax Co., Va.

MOTHER LODE MINES.**BRITISH COLUMBIA**

Owned by British Columbia Copper Co., Ltd.

MOUNT AETNA GOLD & COPPER MINING CO.**UTAH**

Idle several years. Address care S. M. Levy, Salt Lake City, Utah.

Property, 12 claims, partly patented, adjoining the Utah Metal Mining Co., in Oquirrh range, Bingham district. Developed by 3 tunnels, No. 1 of 950', No. 2 of 2,600', and No. 3 of 370', carrying ore assaying up to 15% lead, 3.4 oz. silver and \$10.40 gold per ton, with occasional copper values. No. 1 tunnel has a Fairbanks & Morse engine and an air compressor.

MOUNT ANDREW IRON & COPPER CO.**ALASKA**

Office: Empire Bldg., Seattle, Wash. Letter unclaimed at Ketchikan, Alaska. Harry Bellam, superintendent, at last accounts.

Lands, held under lease from the Mount Andrew Mining Co., on Kasaan peninsula, Prince of Wales island, Alaska, carries chalcopyrite disseminated in magnetite, with hornblende gangue, and ore is practically unaltered from surface, except for a few inches of occasional oxidation, masses of sulphide ore even showing glacial striations, though occasional thin sheets of native copper are found. Ore averages about 3.75% copper and \$1 to \$1.60 per ton in combined gold and silver values. The orebody has been stripped for about 2 acres and is developed by tunnels of 300' and 700', with a 70' blind shaft from the lower tunnel, and 10 small glory-holes, opened upwards to surface from the tunnels.

A 4,600' aerial tram of 40 tons hourly capacity leads from a 50-ton loading bin at the mine to a shipping bunker 500' from tide water. Equipment includes two 50-h. p. boilers, with 5-drill and 7-drill Ingersoll-Sergeant air compressors. Buildings include an office, boarding house, bunk house and smithy. About 125 men are employed.

Property idle for most of the year 1912, but company plans systematic development of mine in near future.

MOUNT ANDREW MINING CO.**ALASKA**

Office: 1105-165 Broadway, New York. Property is the Mt. Andrew copper and iron mine, on Kasaan peninsula, Prince of Wales island, Alaska, under lease and bond to the Mount Andrew Iron & Copper Co.

MOUNT BAKER & SHUKSAN MINING CO.**WASHINGTON**

Idle. Office: 18 Post-Intelligencer Bldg., Seattle, Wash. Letter unclaimed at mine address, Maple Falls, Whatcom Co., Wash. J. Conaway, pres.; C. M. Welch, sec., at last accounts. Lands, 320 acres, said to carry 7,000,000' of good standing timber, with an available water right. Property is said to have several veins, varying from 25 to 100' in width. Development is by 4 tunnels, longest 1,100', with about 3,000' of workings showing gold-copper ore. Equipment includes an air compressor.

MOUNT GLINES GOLD & SILVER MINING CO.**MAINE**

Mine office: Bryant Pond, Oxford Co., Me. Property, slightly developed, shows copper and lead ores. Has steam power and a small mill. Inactive for several years.

MOUNT ROYAL MINING & REDUCTION CO.**MONTANA**

Mine office: Princeton, Granite Co., Mont. L. N. Loomis, president. Property, the Bonner group, 4 claims, a tunnel site and water rights, on Royal mountain, 8 miles from Philipsburg. Claims cover 6,000' of the course of 2 fissure veins carrying gold-copper ore. Development consists of tunnels opening up a body of commercial ore. Reduction works have copper leaching plant designed by J. D. Fields.

MOUNT ST. HELENS CONS. MINING CO.**WASHINGTON**

Office: 516 Selling Bldg., Portland, Ore. Mine office: Spirit Lake, Skamania Co., Wash. Thos. Prince, pres.; H. P. Christiansen, vice-pres.; E. L. Harmon, sec.; Dr. Henry Waldo Coe, treas. and managing director; Andrew Olson, sup.; Geo. W. Lilly, engr. Organized 1902, under laws of Oregon, capitalization \$1,800,000, shares \$1 par.

Lands, 65 claims, patented, 1,300 acres, estimated to carry 45,000,000' of standing timber, on the North fork of the Toutle river and on the shores of Spirit Lake, 50 miles from Portland. It includes the former holdings of the Sweden Copper Co., Calumet Copper Mining Co., Bronze Monarch Mining Co., Chicago Mining Co., Yellow Metal Mining Co., Earl Mining Co. and Cascade Copper Mining Co. The company also owns a three-fourths interest in the United mines. In addition to copper ores the tract contains gold veins, an ochre bed, a granite quarry and a deposit of pumice stone.

The property is said to show syenite, diorite and slate with fissure veins carrying about 20 orebodies ranging from 5 to 100' in estimated width. The ores carry chalcocite, bornite and chalcopryite and vary from 2 to 25% copper, some lead, 2 to 50 oz. silver and \$1 to \$40 gold per ton.

Development consists of a 2,300' tunnel, besides others of 250', 400', 600' and a 50' shaft. The workings total about 5,500' and are estimated by the management to show 125,000 tons of medium and high-grade ores, with a greater tonnage of milling ore.

The Sweden-Norway-Denmark group is reported to have a 30 to 40' vein between diorite and syenite, the footwall streak carrying occasional shoots of rich ore assaying 3 to 20% copper, 4 oz. silver and \$1.50 to \$7 gold per ton. There is said to be 10,000 tons of ore on the dump at this tunnel.

The Earl group shows a strong gossan, carrying small gold values, with occasional bunches of high-grade copper ore.

The Bronze Monarch group, adjoining the Sweden, opened by a 300' tunnel, has produced about 1,000 tons of auriferous and argentiferous copper sulphides.

The Index mine, about 2½ miles from the main group, shows a vein said to be 44' wide, carrying ore with 1.5% copper, 8 oz. silver and \$4 gold per ton.

Equipment includes an 80-h. p. Pelton water wheel and a 6-drill Sullivan air compressor. There is a sawmill, and about 25 shops and cabins at the various camps.

Lands are owned outright and the company has no bonds or debts, but the property has been practically idle for some years awaiting the construction of a much-needed railway.

MOUNT SICKER & B. C. DEV. CO., LTD.**BRITISH COLUMBIA**

Office: 764 Bullitt Bldg., Philadelphia, Pa. Letter unclaimed at Mt. Sicker, Vancouver Island, B. C. Dr. T. J. Jones, pres.; Jas. A. Cameron, sec.-treas. and managing director, at last accounts. Capitalization \$1,000,000.

Lands, 9 claims, 352 acres, 49 miles north of Victoria, in 2 groups, known as the Copper Canyon group of 5 claims, on Mount Sicker and a group of 4 claims on Mount Brenton. Property is in the same geological horizon as the Tyee and Lenora mines and supposedly carries a continuation of the schistose ore belt of those mines. Workings consist of a two-compartment shaft, sunk at an angle of 76°, variously reported as 80' to 144' deep, showing a little good ore in the bottom. Development work on various claims has given encouragement but the company has not yet secured a workable orebody. Equipment is said to include necessary mine buildings. Mine shut down several years and company apparently dormant.

MOUNT SICKER & B. C. DEV. CO., LTD. BRITISH COLUMBIA

Idle. Office: 30 George Square, Glasgow, Scotland. Fred I. Smith, chairman; John D. Steel, sec. Organized Oct. 20, 1898, under laws of Great Britain, capitalization £125,000, shares £1 par. Lands are on Mt. Sicker, Vancouver Island, B. C.

MOUNTAIN COPPER CO. ARIZONA

Letters unclaimed at 42 Broadway, New York, and Safford, Graham Co., Ariz. M. W. Ferris, treasurer, as last accounts. Company was organized as successor of the Gila Valley Copper Co., which in turn succeeded the Federal Mining Co., of odious fame.

Lands are sundry claims in the Lone Star district, Gila mountains, developed by several shallow shafts. There is a 50-ton concentrator and a small pumping plant at Walnut Springs.

Apparently no work has been done by the present company, and the outfit is viewed with much suspicion.

MOUNTAIN COPPER CO., LTD. CALIFORNIA

Secretary's address: A. N. Frewer, 3 Lombard St., London, E. C., England. Operating office: 150 Pine St., San Francisco, Cal. Mine office: Keswick, Shasta Co., Cal. Works office: Martinez, Contra Costa Co., Cal. Capt. F. B. Lawson, chairman; Sir Andrew Noble, Bart., K. C. B., Henry J. Wenham, J. T. Middleton, E. T. McCarthy and N. M. Macdonald, directors; Wm. F. Kett, gen. mgr.; W. L. Cole, mine supt. Jardine, Matheson & Co., Ltd., 74 Wall St., New York, American sales agents.

Organized Dec. 1, 1896, under laws of Great Britain and reorganized May 10, 1902, capitalization £250,000, shares £1 par. In 1899 the company changed its capitalization of £1,250,000 into £250,000 in shares and £1,000,000 in 6% debenture stock, shares £4 par, on which a first payment of £1 per share was made Jan. 16, 1905, leaving £750,000 of stock outstanding. The change in 1899 was practically a complete amortization. Dividends before reconstruction, 1897-1901, aggregated 58½%. Profits were £150,255 in 1907; £28,112 5d. in 1908; £24,557 12s. 4d. in 1909; a deficit of £3,042 in 1910; profit of £50,438 in 1911.

Holdings are extensive, including the Iron Mountain and Hornet mines, 10 miles northwest of Redding. The Iron Mountain mine was opened, 1880, for silver, and was given a 20-stamp mill, 1884, working the gossan in a small way for some years.

The Iron Mountain mine had a gossan of 100 to 300' width, covering a lens of ore, 100 to 400' wide, 800' long and 500' deep, in a shear zone of meta-rhyolite. The ore carries chalcopyrite associated with pyrrhotite averaging about 5% copper, 2 oz. silver and slightly under \$1 gold per ton. The orebody was worked pillar-and-stall, and stopes filled with waste, but pillars have been robbed and the mine now shows little high-grade sulphide ore, though there are reserves of 500,000 tons of silicious ore averaging 4 to 5% copper. The old orebody being pyritic, there was trouble from fires, but the application of the plenum system of ventilation, by Mr. Wright, restored normal conditions. Considerable cement copper was secured from the charged waters coming from the fire zone.

The Hornet mine, lying to the north of the Iron Mountain, developed about 5,000,000 tons of pyritic ore, averaging only about 1% in copper tenor, with patches up to 2.5% copper, and carrying 47 to 50% sulphur. Gold and silver values are very small but the ore is valuable for the manufacture of sulphuric acid, saving the small copper and precious metal values as by-products.

The mines are connected with Keswick by an 11-mile narrow-gauge

steam railway, traversing a rugged country, with an average grade of nearly 4%, the elevation gained being 2,000'.

In Oct., 1913, the company was said to be shipping about 12,500 tons of ore a month from its mines to the Martinez smelter. Employs about 100 men at the mines.

The Keswick smelter, in the canyon of Spring creek, less than a mile from the Sacramento river, had 11 Wright circular calcining furnaces and five 300-ton water-jacket blast furnaces. This plant, fully described Vol. VIII, has been dismantled.

The 350-ton Martinez smelter, on San Francisco bay, includes the old works of the San Francisco Chemical Co., which formed the nucleus of the plant. The Martinez works have one of the most extensive and best planned acid works in existence, built at a cost of approximately \$1,000,000. The Hornet ores, low in copper but rich in sulphur, are burned, the sulphur fumes collected in lead-lined chambers and transformed into sulphuric acid by the Meyer chamber process, the cinder remaining after the roasting is smelted for its copper contents. The acid is sold crude and also is used as the basis of commercial fertilizers for which there is a considerable demand in the rich fruit and agricultural districts of California and the other Pacific coast states. The Martinez works also do a general custom business and are fully equipped with steam, electric and pneumatic power.

Production of ore, April, 1913, was at the rate of about 200 tons daily from the Iron Mountain mine, and 100 tons daily from the Hornet. At one time, only a decade ago, this company was among the largest copper producers of the world, but has since greatly declined in output, production having been 29,727,040 lbs. fine copper in 1901; 19,116,160 lbs. in 1903; 6,814,000 lbs. in 1907; 3,638,619 lbs. in 1908; 2,775,197 lbs. in 1909; 2,987,815 lbs. in 1910; 5,400,000 lbs. in 1911. The company has been managed with great prudence and marked success, both financially and technically and notwithstanding the depletion of an originally rich mine has been able to make a successful change of base by which low-grade pyritic ores are utilized for the manufacture of acid.

MOUNTAIN DELL CONSOLIDATED MINING CO.

UTAH

Office: National Copper Bank, Salt Lake City, Utah. Mine office: American Fork, Utah Co., Utah. John H. Wootton, pres. and supt.; Henry Lewis, vice-pres.; Benjamin B. Hall, sec.; A. W. Raybould, treas.; preceding officers and H. W. Griffith, directors; R. N. Baskin, mine supt. Organized June, 1906, under laws of Utah, capitalization \$100,000, shares 25 cts. par, assessable, with 11 assessments levied to end of 1911; fully issued.

Lands, 9 claims, patented, 180 acres, 18 miles from the San Pedro railway, having a 4' interbedded vein, between limestone and quartzite, with E.-W. strike, traceable 3,000', carrying lead and copper ores, estimated by management to average 5% copper, 37% lead, 60 oz. silver and \$1 gold per ton. Mine is developed by a 300' incline shaft and an 800' tunnel, with 1,200' of workings. There is a small gasoline power plant, and 3 buildings.

MOUNTAIN LAKE MINING CO.

UTAH

Office: Knight Bldg., Provo, Utah. Mine office: Heber, Wasatch Co., Utah. Jesse Knight, pres.; Jas. H. Moyle, vice-pres.; R. E. Allen, sec.-treas.; J. W. Knight, gen. mgr. Organized 1896, under laws of Utah, capitalization \$50,000, shares 10 cts. par, increased, 1900, to \$1,000,000, shares \$1 par, assessable. Shares are listed on the Salt Lake Stock Exchange.

Lands, 7 claims, patented, in the Big Cottonwood and Snake Creek districts, in Wasatch and Salt Lake counties. The property has 2 contact deposits, between diorite and limestone, carrying bornite and chalcopyrite, ore giving assays up to 55% copper and \$210 gold per ton, with estimated

average assay values of 2.5% copper, 2 oz. silver and \$1 gold per ton. Development consists of a tunnel driving from the Snake Creek side, over 5,400' long, with other lesser workings.

MOUNTAIN MEADOWS COPPER CO.

CALIFORNIA

Idle. Office: Security Bldg., Sioux City, Ia. Mine office: Quincy, Plumas Co., Cal. W. G. Lummis, manager, at last accounts. Property, in Lights canyon, has a 950' tunnel, showing auriferous and argentiferous copper ore and a little native copper. Equipment includes steam power and an air compressor. Company comatose and mine shut down several years.

MOUNTAIN MEADOW GROUP.

MONTANA

Address: P. H. McDermott, owner, Helena, Mont. Mine, 4 miles from Pony, Madison Co., Mont., on Willow creek, now operated by leasers. Property shows a fissure vein in granite carrying pyrite and chalcopryite with gold values in quartz gangue. A small log concentration mill handles the output and concentrate is shipped to the East Helena smelter.

MOUNTAIN MINING CO.

COLORADO

Is controlled through stock ownership by the Salida Copper Co., which see. Property is the Griffith mine.

MOUNTAIN MONARCH GOLD MINING CO.

CALIFORNIA

Office: 319 Yuba St., Redding, Cal. Mine office: Shasta, Shasta Co., Cal. W. F. Aram, pres. and gen. mgr.; J. H. Hunter, sec.; C. E. Armstrong, treas., at last accounts. Organized Nov. 25, 1905, under laws of California, capitalization \$75,000, shares \$1 par, in \$25,000 preferred and \$50,000 common stock.

Lands, 11 claims, unpatented, 220 acres, in the Whiskeytown district, north of Redding, 10 miles from the Southern Pacific railway, showing fissure veins in rhyolite, the main one said to be 140' wide, traceable 2,500'. The ore carries malachite, bornite and chalcopryite associated with pyrite, and averages 7% copper, 1.5 oz. silver and \$3.40 gold per ton. Development is by tunnels of 200' and 750', with 1,200' of workings. Equipment includes steam and gasoline power with a 6,000' sawmill and 5 mine buildings. Idle.

MOUNTAIN VIEW DEVELOPMENT CO.

ARIZONA

Letters unclaimed at Bisbee, Cochise Co., Ariz. Geo. Bennett, pres.; W. D. Kinsey, sec., at last accounts. Organized 1903, under laws of Arizona, capitalization \$1,000,000, shares \$1 par.

Lands, 9 claims, at the head of the Dixie canyon, 4 miles northwest of Bisbee. The mine has 2 shallow shafts and a tunnel at last accounts developing copper ore, with occasional lead, and a small test shipment gave returns of 16.74% copper and 100 oz. silver per ton. Property was being worked by leaser at last reports.

MUDERSBACH MINE.

ARIZONA

Near Bouse, Yuma Co., Ariz. See Record Mines Co.

MULBERRY MINING CO.

NEW MEXICO

Office: care H. M. Gray, Tyrone, Pa. Mine address: Lordsburg, Grant Co., N. M. Property, about 400 acres, in the Virginia district, showing 7 fissure veins.

Development consists of a 500' shaft and numerous shallow shafts and pits, with an aggregate of about 3,000' of workings, showing gold-copper and lead ores.

Equipment includes steam power, with air compressor, and there is a 50-ton concentrator. Was developing with small force at last accounts.

MULOCK MINE.

MICHIGAN

Idle. Office: care R. P. Mulock, owner, Colfax, Ia. Mine near Matchwood, Ontonagon Co., Mich. Lands, 240 acres, being the N. W. $\frac{1}{4}$ of Sec. 9 and the N. W. $\frac{1}{4}$ of N. W. $\frac{1}{4}$ and S. W. $\frac{1}{4}$ of S. W. $\frac{1}{4}$ of Sec. 15,

T. 49 N., R. 41 W., one-half mile northwest of the Norwich mine. Exploratory work, 1903-05, showed 4 cupriferous amygdaloidal beds, of which two, that were about 400' apart, averaging 6' and 15' in width, were opened by several pits, showing copper.

MULTNOMAH MINING, MILLING & DEV. CO. WASHINGTON

Office: 346 Broadway, New York. Mine office: Nespelem, Okanogan Co., Wash. J. M. Hudnut, pres.; M. J. Hills, vice-pres. and sec.; Dr. F. O. Hudnutt, asst. sec. and gen. mgr.; Geo. S. Wickman, treas., at last accounts. Organized 1901, under laws of Washington, capitalization \$2,000,000, shares \$1 par.

Lands, about 600 acres, in 4 groups, including the River group of 260 acres, patented, carrying placer gold; the Mineral Hill group of 100 acres, 3 miles west of Nespelem; the Multnomah group of 180 acres, 4 miles west of Nespelem, and the Ramsey group of 60 acres, adjoining the Nespelem Central Mining Co., 5 miles west of Nespelem. The Ramsey group is said to show high-grade gold-copper ore. The Multnomah group has a tunnel of about 1,100', said to cut a 15' vein, showing mainly auriferous and argentiferous lead ore. Mine as a whole is said to have about one-half mile of workings. There are 5 buildings, and a dam built across the Nespelem river. Presumably idle and no returns securable, 1913.

MUMME MINING CO.

ARIZONA

Office: 1502 S. Flores St., San Antonio, Tex. Mine office: Patagonia, Santa Cruz Co., Ariz. T. E. Mumme, pres. and gen. mgr.; E. J. Mockert, vice-pres.; H. P. Mockert, sec.; Geo. F. Wieland, supt. Organized Sept. 20, 1910, under laws of Arizona, capitalization \$100,000, shares \$1 par; issued, 61,000 shares. Also has \$10,000 debentures authorized, but unissued.

Lands, 7 claims, patented, in the Harshaw district, 6 miles from Patagonia, showing 2 veins of about 7' average width, carrying gold and silver-bearing copper ore, said to average about 9% copper, 22 oz. silver and \$4 gold per ton.

Development is by a 50' shaft and 3 tunnels, longest 320'. The mine has no power equipment.

MURPHY COPPER MINE.

BRITISH COLUMBIA

Address: A. Beamer and A. E. Raab, operators, Hope, B. C. Property, a group of 8 claims, situated on the northern side of the Fraser river, a mile above Hope station on the C. P. R. R. The mine, located and worked about 1865, shows gold-copper ore in a netted vein in igneous rocks. Development consists of an 800' adit and numerous old pits and trenches. Property now under bond and lease to firm named above.

MURRAY-ISABEL MINES CO.

COLORADO

Idle. Office: Parkdale, Fremont Co., Colo. W. H. Murray, Jr., and J. F. Murray, owners. Lands, 7 miles from a railway, have a vein of 7 to 10' width, carrying ore giving average assays of 7% copper, 6 oz. silver and \$2 gold per ton, opened by a 300' shaft and a 220' tunnel. Closed down for several years.

NACIONAL; COMPANIA MINERA LA.

MEXICO

Idle. Mine office: El Salado, Catorce, San Luis Potosi, Mex. Miguel Ferrara, pres.; José M. Parga, mgr., at last accounts. Property is the Saltillito mines, producing silver, gold, copper and iron ore.

NACO CONSOLIDATED COPPER CO.

ARIZONA

Idle. Last address: 228 West Fourth St., Los Angeles, Cal. Letter unclaimed at Turkey, Yavapai Co., Ariz. A. J. Paden, pres.; Wm. Theising, vice-pres.; Chas. W. Stewart, sec.-treas.; preceding officers, J. Ross Campbell and J. W. McBride, directors, at last report. Organized Oct. 26, 1906, under laws of Arizona, capitalization \$2,000,000, shares \$1 par. Lands,

20 claims, 400 acres, including the Yankee Chief and Comet groups, in the Black Canyon district, 3 miles from Turkey. Development is by 2 shafts, with about 700' of workings, showing sulphide ores. Company advertised a few years ago that it had one of the "biggest, richest, surest things, and quickest money-makers ever offered to date," each statement being absolutely untrue. Closed down several years, and deservedly dormant.

NACO SMELTING & REFINING CO.

ARIZONA

Probably dead. Letter unclaimed at Naco, Cochise Co., Ariz., and Los Angeles, Cal. Fully described Vol. VIII.

NACAZARI CONSOLIDATED COPPER CO.

MEXICO

Address: P. O. Box 64, Douglas, Ariz. Mine address: Pilares de Nacazari, Sonora, Mex. John G. Alexander, pres. and gen. mgr.; R. R. Humphrey, vice-pres.; George Motz, sec.; John Gaughran, treas.; preceding officers, Geo. S. Howard, J. Cota Leon, J. A. Finney and N. Cohen, directors. B. R. Russell, mine supt. and purch. agt.; S. A. Gardainer, chemist-assayer. Organized July, 1907, under laws of Arizona, capitalization \$3,000,000, shares \$5 par, fully paid and nonassessable; issued, 420,000; 25,000 shares sold for \$1 each in Sept., 1913. Annual meeting, second Tuesday in July.

Property consists of various claims, 245 acres, lying in 2 groups near the Pilares mine of the Moctezuma Copper Co. The Galera group shows andesite and brecciated rhyolite cut by several veins carrying complex sulphide ores with gold and silver values. The other group which adjoins the Pilares mine, shows a big red reef, 300' wide, of brecciated, silicious vein matter outcropping on the Copper King claim and supposedly an extension of the Pilares deposit.

The Galera group is opened by a long tunnel driven on the vein developing narrow streaks of high-grade shipping ore. Company has spent much of its money on the main, or No. 1, tunnel (1,800' long in Oct., 1913), driven towards the Red Hill to undercut the Copper King outcrop. This tunnel cuts several 2 to 6' veins on which drifts are now being run and complex sulphide ores developed. This ore runs high in lead, carries considerable zinc, 3 to 4% copper, 60 to 70 oz. silver and a few dollars in gold. At 1,400' from the portal, and 300' beneath the surface, the tunnel entered a vein a foot wide which has been followed up for 300', widening to 2' of ore said to average 2.25% copper, 30% lead, 15% zinc, 64 oz. silver and 60 cts. gold. Total development to date is 2,948', including 3 shallow shafts and a number of prospect tunnels. Management estimates 29,900 tons of ore blocked out with an average content of 1½% copper, 10% lead, 7% zinc, 15 oz. silver and 50 cts. gold per ton.

In Oct., 1913, company ordered and paid for the machinery of a 100-ton concentration mill and has graded foundation site. The plant is expected to be complete in Jan., 1914.

Property is in an excellent location, has promising ground and a chance to find a large ore deposit of milling ore. Veins thus far discovered show a good grade of ore, but the future of the company depends upon the results of further exploration work.

NANAIMO JUBILEE MG. & DEV. CO., LTD.

BRITISH COLUMBIA

Idle. Mine near Dunsmuir, Vancouver Island, B. C. Described Vol. X.

NAPOLEON MINE.

CALIFORNIA

Idle many years. Mine near Copperopolis, Calaveras Co., Cal. Josephine H. Sullivan, owner; Lewis and Benj. Williams, lessees, at last accounts. This is the oldest copper mine in California and was a considerable producer in early days, 1865. The property shows a 100' ore channel, ranging from diabase to talcose schist, having lenticular orebodies up to 20' in

width, carrying mainly copper sulphides. Development is by a 430' new main shaft and a 325' old shaft, to the eastward.

NAPOLEON MINE.

WASHINGTON

See British Columbia Copper Co.; at Marcus, Stevens Co., Wash.

NATICK COPPER CO.

MICHIGAN

Office: Leopold Bldg., Houghton, Mich. Mine near Copper Falls, Keweenaw Co., Mich. Frederick W. Nichols, resident manager. Lands, 180 acres, being the N.E. $\frac{1}{4}$ and E. diagonal $\frac{1}{2}$ of E. $\frac{1}{2}$ of N.W. $\frac{1}{4}$ of Sec. 28, T. 58 N., R. 31 W., surrounded by holdings of the Frontenac Copper Co. Property slightly explored in early days, has been idle many years.

NATIONAL CONSOLIDATED MINING CO.

ARIZONA

Office: 420 Milwaukee Ave., Chicago, Ill. Operating office: Nogales, Ariz. Letter returned unclaimed from former mine office, Patagonia, Santa Cruz Co., Ariz. Oscar E. Porter, pres.; Geo. D. Gross, vice-pres., and gen. mgr.; D. F. Orange, sec.; Alfred Thurtell, treas., and S. F. Johnson, directors. Organized Dec. 9, 1905, under laws of Arizona, capitalization \$1,000,000, shares \$1 par, nonassessable. Annual meeting, first Monday after first Tuesday in January.

Lands, 21 claims, about 400 acres, and 40 acres in mill sites, property including the Silver Glance group, about 12 miles northwest of Nogales. Lands show decomposed granite, diorite and occasional limestone, carrying about 20 fissure veins and contact deposits, of which 6 are partly developed. Principal vein, of 12' average width, carrying chalcocite and galena, estimated to average 3% copper, 10% lead, 12 oz. silver and \$9.75 gold per ton. Development by shafts of 60', 200', 80' and 75', and tunnels of 193' and 120'.

Equipment includes a 12-h. p. Fairbanks & Morse gasoline hoist and there are 5 mine buildings.

NATIONAL COPPER CO.

CALIFORNIA

Idle. Letters to 202 Bullard Blk., Los Angeles, Cal., unanswered. Mine near Needles, San Bernardino Co., Cal. Fredk. H. Newton, pres. and gen. mgr.; Jas. H. Newton, vice-pres. and treas.; A. E. Miller, sec., at last accounts. Organized under laws of California, capitalization \$5,000,000, shares \$1 par, of which \$2,500,000 was given for property. Authorized, 1907, a \$100,000 issue of \$1,000 ten-year 8% bonds.

Lands, 29 claims, 4 fractional, about 40 miles south of Needles and 22 miles north of Parker, Ariz., in the Whipple Mountain district, said to show strong veins, developed by shafts of 75' and 100', with a gasoline hoist. There are several mine buildings, including a 20x30' office.

NATIONAL COPPER CO.

NEW MEXICO

Chas. P. Laughlin, secretary, Tyrone, Grant Co., N. M. Organized Feb., 1902, capitalization \$1,200,000, shares \$100 par.

Lands, 22 claims, 10 patented, 4 miles from the Chemung Copper Co., in Whitewater canyon, Burro Mountain district. The property has a fissure vein, in granite, of 60' estimated average width, carrying mainly chalcocite, opened by a 200' shaft and a 360' tunnel having a 214' blind shaft. The mine shows considerable bodies of copper ore, mainly in disseminated sulphides of 2 to 3% copper tenor, with some ore carrying up to 15 and 20% copper. Equipment includes steam power and a Norwalk air compressor. Presumably idle.

NATIONAL COPPER MINING CO., LTD.

IDAHO

Address: August Paulsen, pres., Spokane, Wash. Mine at Mullan, Shoshone Co., Idaho. A. P. McCrae, vice-pres., Mullan, Idaho; Chas. McKinnis, sec.-treas. and mgr.; foregoing with Harry White, Jas. F. McCarthy, H. H. Stambaugh and R. C. Steese, directors. Organized Sept. 22, 1906, under laws of Washington, capitalization 2,000,000 shares, \$1 par,

increased from 1,250,000 shares in July, 1913; 1,200,000 issued; 800,000 shares treasury stock were sold at 50 cts. Assessment of 1 ct. per share levied March, 1913. Had \$300,000 in treasury Aug. 15, 1913.

Property lies in Deadman gulch between Mullan and Larsen, on the north side of the Coeur d'Alene valley. It is about $1\frac{1}{2}$ miles west of and in the same belt as the Snowstorm copper property, which it closely resembles in character. Ore occurs in a fault vein in thickly-bedded white Revette quartzite with talcose slips bordering the ore. The vein runs nearly east and west and dips steeply to south. The surface gives no indications of the great orebody 1,700' beneath it and in fact the ore-bearing quartzite does not show in the upper workings.

During the "boom" days of 1906-07, the company sank a 400' shaft and drove an adit tunnel developing a fissure vein and a strong fault, but found no ore in commercial quantity and no especially favorable indications of a large orebody. Since that period the management has been driving a crosscut tunnel as rapidly as funds permitted, getting little encouragement, endeavoring for a year past to open a lead-silver fissure until Dec., 1912, when a large body of silver-bearing copper ore was cut at a distance of 4,380' from the portal, about 1,000' lower than the old tunnel and shaft. The crosscut tunnel is driven about 4,000' through very hard and tight Wallace slates and St. Regis quartzites to a fault separating the St. Regis from the more favorable Revette quartzite. This fault showed scattering lead and copper mineralization, but no commercial ore. Beyond this fault the beds of white Revette quartzite run northwest and southeast, dipping steeply, 80° , to the southeast. About 200' from the big fault zone just noted, there is a nearly vertical quartz vein, filling a fault in Revette quartzite, the beds north of this vein running slightly north of west and dipping at but 45° south. This vein carries copper ore and a drift east disclosed the great orebody which has given the mine its present prominence. The extent of the ore shoot is not yet known, but it is 50 to 100' wide, over 500' long and proven downward for several hundred feet by drilling. A sample cut across the orebody where it was 85' wide showed an average value of $2\frac{1}{2}\%$ copper, 5 oz. silver and 80 cts. in gold.

Development consists of a 1,200' upper tunnel, 4,800' lower crosscut tunnel with about 1,000' of drifting on the vein and a 400' shaft with 400' drifting.

An examination and report made by Fred T. Greene in June, 1913, is said to give the total value of developed, probable, and possible ore, as \$8,417,890. His estimates of tonnage, as given in the press, are as follows: Above tunnel level 247,890 tons partly developed and 207,520 tons possible ore; below tunnel level, 883,990 tons partly developed, 875,400 probable ore and 1,830,260 possible ore.

This great orebody is now being prepared for stoping and \$300,000 will be spent in constructing a 500-ton concentrator, flotation plant, 2-mile trolley line and other works nearly completed Nov. 1, 1913. The concentrator is designed by the General Engineering Co. of Salt Lake City and the construction work is under the direction of Karl Bernson. Production is expected to begin early in 1914.

NATIONAL COPPER MNG. & DEVEL. CO. PENNSYLVANIA

Main office: Belvidere, Warren Co., N. J. Mine in Adams Co., Pa. Chas. O. Lane, pres.; Henry D. Deshler, sec.-treas. and gen. mgr.; Edw. March, Harry Bossard and John Paul, directors. Organized Dec. 16, 1905, under laws of New Jersey, capitalization \$500,000, shares \$1 par, fully paid and non-assessable; issued, 118,985. Annual meeting, third Monday in March.

Property, 2 claims, 155 acres, in Adams county, Pennsylvania. Ore occurs in veins in a schist formed from porphyry and marked by epidote; strike northeast and southwest with average dip of 85°. One vein under development said to average 16' wide carrying 5% copper, 1.40 oz. silver and \$6.80 gold per ton. Development to date by open cut and shallow shafts.

NATIONAL COPPER TEMPERING CO.

COLORADO

Office: Cincinnati, Ohio. Has a so-called copper tempering process. Stock believed to be without value. See Vol. X.

NATIONAL GOLD & SILVER MINING CO.

NEW MEXICO

Idle. Mine near Steins, Grant Co., N. M. M. H. Sherman, pres.; B. L. Berkey, supt., at last accounts. Has steam power and a 50-ton concentrator.

NATIONAL METALLURGICAL CO.

MEXICO

Office: 165 Broadway, New York. Mine and smelter at Matehuala, San Luis Potosi, Mex. Geo. C. Kaufman, mgr. mining department of American Smelters Securities Co.; Samuel James, mgr. Matehuala plant. Is controlled, since 1910, by American Smelters Securities Co., itself owned by the American Smelting & Refining Co.

Organized Aug., 1901, under laws of Colorado, capitalization \$1,000,000, shares \$25 par. Debentures, \$500,000 authorized, at 6%; issued \$472,000. Annual meeting, last Tuesday in July. Holds title to property through the Compania Metalurgica Nacional, organized in Mexico.

The Dolores mine is situated a few miles from Matehuala, in the state of San Luis Potosi, Mex., in an isolated diminutive mountain range known as the Sierra del Fraile. The range runs north and south, is less than 3 miles long and 1 mile wide and consists of Mesozoic blue limestone, which has been intruded by quartz-monzonite and the metamorphism and ore deposition in the range is connected with these intrusions. In the Dolores property the intrusive rock occupies a belt about 1,000 m. long, and 300 to 400 m. wide. Surrounding it, and lying between it and the limestone, is a practically continuous band of lime-silicate rock, plainly of metamorphic origin. Nowhere does this rock pass into the limestone far from the intrusion.

The ore deposits consist mainly of cupriferous pyrite, are intimately associated with the lime-silicate rock and occur largely at the very contact, frequently with limestone as one wall. This cupriferous pyrite has usually a gangue made up largely of pyroxene and garnet. There are 2 intrusions, the Dolores on the south and the Cobriva on the north, the latter being irregular.

The company owns the ground about both of these intrusive masses and works the gold-copper ore in the Tiro General, Dolores, Trinidad, Azul, La Luz and El Angel mines. The copper ores as shipped average 5% copper, 50 to 80 grams silver and about \$2 gold per ton. The geology of the district is well described by Spurr, Garry and Fenner in *Journal of Geology*, Vol. VII, p. 444, 1912.

The principal mines are connected with the smelter by the 7-mile Matehuala narrow-gauge railway.

The smelter, connected by a spur with the Mexican Central railway, receiving ore by rail and burros, has 150-ton and 200-ton water-jacket blast furnaces for lead and copper, with a calcining furnace and a 30-ton reverberatory furnace used for flue dust. There also is a small sampling mill. Product formerly was matte, averaging 45% copper, 50 to 200 oz. silver and 1 oz. gold per ton, shipped to the Aguascalientes smelter for conversion.

The smelter power plant formerly included three 125-h. p. boilers and

a 275-h. p. Corliss tandem-compound engine direct-connected to a 150-h. p. generator, with a number of smaller generators and motors.

Is a splendid property, well managed, with an adaptation of Mexican methods and labor to modern conditions. Mine development has utilized geological work to great advantage.

NATIONAL MINES & SMELTERS CO.

MEXICO

Office: Magee Bldg., Pittsburgh, Pa. Mine office: Magistral, Durango, Mex. S. H. McKee, pres.; Wm. L. Curry, vice-pres.; John S. Eberman, sec.-treas.; Renald Ailes, financial agt.; E. A. Kennedy, supt. Organized 1911, capital \$2,500,000; issued, 1,700,000 shares. Authorized, \$400,000 collateral income bond issue; issued, \$375,000. Company owns all the stock of the Santa Maria del Oro Mines Co., which company purchased property of the Lustre Mining & Smelting Co. from old stockholders, paying for same in stock and bonds of the National Mines & Smelters Co.

Property, 32 claims, 441 hectares, 1,089 acres of mineral lands, 397 hectares of mill and smelter sites, besides miscellaneous lands and leasehold timber lands.

The Magistral mine is developed by 3 tunnels and 9 shafts and has a large body of slightly cupriferous pyrite with quartz and limestone gangue, carrying 0.5 to 5% copper, probably averaging under 1% copper, 1 oz. silver and 15 to 20 grams gold per metric ton.

The Cocinera mine has been developed by the new company since July 1, 1911, opening up an ore shoot 1,000' long, 15' wide and said to average \$10 in gold and copper with a little silver. Company is now sinking from the 7th to 8th level, the depth being 647'. Ore reserves in this and the Azurite mines are estimated by the management at 190,000 tons, developed in new ground since 1911. The old company claimed reserves of 185,000 tons in other and entirely distinct orebodies, in 1910.

The new company has thus far confined itself entirely to the development of the known and most accessible orebodies, as the Mexican revolution has interfered with work and prevented resumption of operations on a large scale.

The equipment is very complete in all departments, including a central power plant having two 360-h. p. Koerting and two 350-h. p. Crossley gas engines, one 200-h. p. and three 400-h. p. gas producers, a 2,300-volt 3-phase generator, two 6-drill Ingersoll-Rand air compressors and 10 hoists of 100 to 300-h. p.

The 40-stamp mill, 750-lb. heads, has Huntington mills, 1 Ball mill and 10 Frue vanners.

The present concentrator has 2 Huntington mills, a chlorination plant and a cyanide plant.

The smelter has 6 blast furnaces, including two 150-ton hot-blast furnaces and three 200-ton 42x126" furnaces, air for blast being heated by waste gases in a specially-designed MacDonald hot-blast heater.

The stamp mill and concentration plant have been idle for some time and the lack of development in the mine resulted in a shortage of fluxing ore and as the smelter could not operate successfully on the highly silicious material mined it had to close down. The old company apparently spent a million dollars or so for installation before the mines were sufficiently developed to provide the ores necessary to keep the various plants running and in 1907-08 became financially embarrassed. The mines are not yet on a profitable basis, but with the installation of a new concentration plant, planned for 1914, as the result of tests made by Henry E. Wood & Co., of Denver, it is expected that the property will yield a satisfactory return on the investment.

NATIONAL MINING CO.**MICHIGAN**

Idle many years. Office: 6 Beacon St., Boston, Mass. Mine office: Rockland, Ontonagon Co., Mich. B. T. Morrison, pres.; Harry Highley, sec.-treas.; Chas. M. Baker, Harry M. Howard and W. S. Warn, directors. Organized 1848, under laws of Michigan, rechartered 1878, capitalization increased later to \$2,500,000, shares \$25 par; issued, \$1,875,000, and rechartered 1908. Paid dividends, 1861-72, of \$320,000, and levied a 40-ct. assessment 1909. The company has no debts.

Lands, 1,852 acres, having the Michigan on the north and east and the Victoria on the south and west. The company explored various other tracts for several years before beginning work, 1852, on the present mine, which carries the western continuation of the contact vein of the old Minnesota mine, now owned by the Michigan Copper Mining Co. The property showed, when work was begun, remains of ancient mining operations, including a shaft of 50' depth, timbered and scaffolded, with a nearly continuous sheet of copper extending down 1 side of the shaft. The company had considerable litigation with the old Minnesota company over title to 115 acres of land, the National finally winning. The mine was let on tribute, 1873-80 and excellent profits were secured by the tributors, but the mine was badly used up. The company resumed work, on its own account, 1880, but was unable to bring the mine to the point of profitable production and stopped work 1893. The mine is connected with the old Minnesota mine of the Michigan, between the 50 and 70 fathom levels, but the connection has been dammed. The machinery plant, entirely obsolete, was sold for scrap iron, 1908.

NATIONAL NATIVIDAD COPPER CO.**MEXICO**

Office: 251 Main St., Dallas, Tex. Mine office: Oaxaca, Mex. Isaac B. Walker, pres.; D. Head, vice-pres.; A. M. Walker, sec.; F. Wiebens, mgr.; H. J. Hazzard, supt. Owns 7 properties, including the Natividad, Dallas, Banco, San Diego, San Diego Annex, San Diego No. 2 and Durant mines, carrying auriferous and argentiferous copper and lead ores. Principal development is on the San Diego group, in which the ores are said to average \$19 per ton, though very high-grade ore occurs. The Natividad mine has a 120' two-compartment shaft, showing a 4' vein carrying mainly copper values, with a hanging-wall paystreak carrying ore claimed by the company to average \$50 to \$100 in combined values. The Santiago mine is reported to have 4 parallel veins carrying outcrops claimed to assay \$290 to \$1,800 gold per ton, planned to be opened by a 400' tunnel. El Banco mine has a 40' shaft said to show gold and silver values. The Dallas mine has several prospect pits, and the Durant mine is apparently undeveloped. Equipment includes steam power. The revolution in Mexico caused the company to close the mines down until their peaceful operation can be assured.

NATIONAL SMELTING CO.**MEXICO**

Idle. Office: 2030 Land Title Bldg., Philadelphia, Pa. Mine office: Chalchihuites, Zacatecas, Mex. L. H. Taylor, Jr., pres.; Richard G. Park, vice-pres.; Paul W. Meyers, sec.; John J. Little, treas., and Wm. C. Haddock, directors. Organized March 27, 1906, under laws of Maine, capitalization \$1,000,000, shares \$5 par; issued, \$389,375, in 1908. A former \$150,000 issue of 6% bonds was converted into stock, at par. Dividends were \$14,000, in 1907, none since. Company holds property through the Compañía Benificiadora de Chalchihuites, S. A., organized under laws of Mexico. Annual meeting, first Monday in June.

Company owns 178 hectares, besides 38 acres of mill and smelter sites, and sundry water rights. Mineral lands, in 8 groups, showing limestone, with several intrusions of eruptive rocks, carry fissure veins in the erup-

tives, and contact deposits in limestone, with values mainly in copper and silver-lead ores. Lands include La Colorada silver-lead mine, La Anaconda mine of iron fluxing ore, La Espléndida silver-gold mine, El Manto and El Tigre silver-gold mines, La Estufa and La Constancia silver-lead mines, La Santa Rita de Los Bobos mine, and a stock control of the Núngano mine, which has argentiferous lead and copper ores.

The Anaconda mine shows a 36' vein carrying ore averaging 2.5 to 3% copper. The Núngano has an orebody of 6 to 15' width, developed for 120' in length and 160' in depth, giving 2.5 to 3% copper ore, opened by shafts of 30', 60' and 160', and by tunnels of 250' and 300'. The other mines carry silver-lead ores, ranging from 20 to 45% lead, 10 to 50 oz. silver and \$2 to \$5 gold per ton.

Equipment small but sufficient for working the property on present scale. The concentrator of 60 tons daily capacity has a 14x17" Dodge crusher, 2 pairs of rolls, 3 New Century jigs, 2 Standard tables and settling tanks. The smelter, now idle, has 2 small blast furnaces and a reverberatory with accessory roasters and necessary machinery.

The company became involved in litigation, 1906, which was settled, 1908, leaving the property in the company's possession and free from debt. The corporation has, however, been without working capital for some years and the revolutionary conditions in Mexico have made a refinancing of the company impracticable. The Durango Canitas railroad is now built to the district, materially improving the economic conditions and lowering the working costs.

NATIVE COPPER CO.

MICHIGAN

Idle since 1855. Office: 60 Congress St., Boston, Mass. Mine at Delaware Mine, Keweenaw Co., Mich. John C. Watson, pres.; Arthur C. Paine, sec.-treas.; Ashley Watson, M. Augustus O'Neil and Frank L. Van Orden, directors. Organized 1849, and reorganized March 29, 1880, under laws of Michigan, capitalization \$1,000,000, shares \$25 par; fully issued. Annual meeting, first Wednesday in March.

Lands, 480 acres, being the S. $\frac{1}{2}$ of Sec. 3 and N. W. $\frac{1}{4}$ of Sec. 10, T. 58 N., R. 30 W., all on the Keweenawan trap belt. A little work was done, 1852-55, on a fissure vein crossing the ashbed, the company levying assessments of about \$39,000.

NATIVE COPPER MINING CO.

CALIFORNIA

Incorporated in 1911 to develop the Copper King, Native Copper and other claims on Table mountain, Monterey county, Cal. W. H. Kerr, Coal-
ing, Cal., president.

NATIVE COPPER MINING CO.

NEVADA

Idle. Letters to Reno, Nev., and Yerington, Lyon Co., Nev., unanswered. Benj. Curler, pres.; H. Pennington, vice-pres. and mgr.; W. T. Wilson, sec.-treas., at last accounts. Organized under laws of Nevada, capitalization \$500,000, shares \$1 par. Lands, 4 claims, unpatented, near the Bluestone mine, about 3 miles west of Yerington, said to have an 8' vein carrying copper ore and free gold, assaying up to 20% copper and \$871.76 gold per ton, opened by 3 short tunnels, longest 185'. Shipped 20 tons of ore to Thompson smelter in 1912.

NAUMKEAG COPPER CO.

MICHIGAN

Office: 42 Broadway, New York. Mine office: Houghton, Mich. J. Parke Channing, pres.; Sam A. Lewisohn, vice-pres.; J. H. Susmann, sec.-treas.; preceding officers, Adolph Lewisohn, I. J. Sturgis, F. L. Van Orden, Theo. L. Hermann and Chas. J. Paine, Jr., directors. Sidney S. Lang, supt. Organized March 21, 1912, under laws of Michigan, capitalization \$5,000,000, shares, \$25 par, \$10 paid in; issued, 102,000 shares. Company ended 1912

with a cash balance of \$232,152. U. S. Mortgage & Trust Co., registrar. Annual meeting, third Wednesday in March.

Lands, 1,200 acres, in Secs. 34 and 35, T. 55 N., R. 34 W., and Sec. 3, T. 54 N., R. 34 W., just west of the village of Houghton, on the south shore of Portage lake. The property carries practically all of the Ashbed amygdaloidal beds, including the Atlantic and the Quincy-Pewabic lodes.

Property was slightly explored under former owners, but efforts were sporadic and altogether unimportant. Operations by present owners were begun July 10, 1912, in the horizon of the Hancock lodes. Drill borings yielded good showings of copper at depth of 513' in what is presumed to be an extension of Hancock No. 3 lode, and again at a depth of 1,301' where a 6" streak of coarse copper was encountered. Hole "B" went to a depth of 1,378', passing through the Atlantic lode at 250' and through the Pewabic lode at 1,295'. The first showed practically no copper and the latter only about 6" of copper, finely distributed. This hole, however, did cut 3' of heavy copper ground at a depth of 535' in an unidentified lode. Hole "C" showed slight traces of copper at depth of 261' in the Atlantic lode, trace of copper at 650', a little fine copper at 720' and about 3" of copper at a depth of 970'. Hole "D" revealed traces of copper at various depths between 198' and 1,044'. Hole "E" made showings similar to those noted in "D." Hole "F" encountered 21' of copper at a depth of 483 to 504', and lesser amounts at 904' and 1,134'. Hole "H" yielded good copper showings at 330', 401' and 665'. Other work is centered in the sinking of an exploratory shaft in the approximate horizon of the Pewabic lode, and the extension of an exploratory crosscut from the end of an old adit opened many years ago on this lode, in the South Side tract. This adit, 200' in length, reveals traces of copper for about 100'.

The property is decidedly promising and the management is excellent in every respect.

NE PLUS ULTRA MINES.

CALIFORNIA

Formerly owned by California-Nevada Copper Co., now bankrupt.

NEBRASKA & ARIZONA COPPER CO.

ARIZONA

Address: Paradise, Cochise Co., Ariz. W. K. Morrow, superintendent at last report. Was organized Jan., 1910, and was merged June 25, 1910, with the California & Paradise Mining Co., in the California & Paradise Consolidated Mining Co. Lands, 13 claims, known as the Morrow & Chamberlain group, developed by a shaft on the Malachite claim.

Company resumed operations in June, 1912, after several years of idleness, sinking the old 200' Malachite shaft with 2 shifts and crosscutting in November on the 600' level.

NEEDLES MG. & SM. CO.

ARIZONA AND CALIFORNIA

Office: 400-55 Congress St., Boston, Mass. Mine office: Chloride, Mohave Co., Ariz. Works office: Needles, San Bernardino Co., Cal. Wm. G. Sharp, pres.; C. G. Rice, vice-pres.; F. W. Batchelder, sec.-treas.; preceding officers, B. Preston Clark, Albert F. Holden, S. W. Winslow and Jas. J. Storrow, directors; D. R. Muir, mgr. Organized under laws of Maine, capitalization \$5,000,000, as successor of Arizona-Mexican Mining & Smelting Co., and is owned through entire stock issue by United States Smelting, Refining & Mining Co.

Property consists of various mines and claims in California and Arizona, a limestone quarry in San Bernardino county, California, and a smelter on the bank of the Colorado river, 1 mile northwest of Needles. The predecessor of the company also held mining lands at Siam, Cal., and 16 idle claims near Florence, Pinal Co., Ariz. The mining properties, in the

Chloride, Stockton Hill and Cerbat districts of Mohave county, Arizona, carry values mainly in silver, lead and zinc.

The Tennessee mine, at Chloride, has a vein up to 10' in width, carrying argentiferous lead, zinc and iron sulphides, opened by an 800' shaft. The mine produces 200 tons per day. The Stockton Hill or Banner mine, 12 miles north of Kingman, has argentiferous and slightly auriferous lead ore, of good average tenor, opened by a tunnel of 1,300'.

This company also operates the Gold Roads mine, between Kingman and Needles, producing 200 tons of \$15 gold ore daily.

The Needles smelter of 300 tons capacity is not now operating. Equipment includes 2 McDougal roasters, a 46x120" lead stack, and a small copper stack, with a 100' steel smokestack, 65-h. p. engine and No. 6 Connersville blower. There is a 35x37' sampling mill, and a 250-ton concentrator handling lead and zinc ore on the same method as is used in the Midvale plant of the United States Smelting Co.

NELLIE MINE.

IDAHO

Owned by Jack Alger and Capt. A. P. Horton of Osburn and O. R. Young of Wallace, Shoshone Co., Idaho. Property, 1½ miles from Osborn, on O. W. R. & N. R. R., has a fissure vein with gray copper ore (tetrahedrite) in quartz, the ore being said to carry 100 to 240 oz. silver per ton. Shipped 25 tons in Oct., 1912. Has water-power plant for pumping and hoisting work.

NELSON MINING CO.

ARIZONA

Office: 609 Land Title Bldg., Philadelphia, Pa. Mine near Crown King, Yavapai Co., Ariz. Geo. P. Harrington, superintendent. Property is half way between town of Crown King and mine of that name. Has fissure vein carrying gold-copper ore, developed by 900' tunnel and 300' incline shaft on vein.

Equipment includes 25-h. p. gasoline hoist, air compressor, and company is reported to employ an average force of 15 men.

NEST EGG GOLD & COPPER MINING CO.

NEVADA

Office: 402 Majestic Bldg., Denver, Colo. Mine near Kimberly, White Pine Co., Nev. David J. Reed, pres.; E. B. Henderson, vice-pres.; Albert L. Hiller, sec.-treas., at last accounts. Organized Feb. 9, 1907, under laws of Arizona, capitalization \$1,500,000, shares \$1 par.

Property consists of the Portland group of claims near Kimberly, adjoining the Giroux holdings in the Ely district, Nevada. The ground is 4 miles from the railway line and is practically undeveloped, but may be regarded as a promising prospect. The company is also reported to own 2 claims in the Bullfrog district and claims near Searchlight.

No record of recent operations can be secured and it looks as if the company had been organized to work the public and not the mine.

NESTOR MINING CO.

ALASKA

John Wick, manager, Hadley, Alaska. Owns the Nestor, Pelaska and other claims, about 1¼ miles from the Mamie and Stevenstown mines near Hadley, Ketchikan district, in southeastern Alaska. Property shows a copper-bearing contact between a diabase dike and limestone, whose garnet-epidote rock carries chalcopyrite. Property has 2 tunnels at 110' and 180' above tidewater, with an aggregate of 600' of work on Nestor claim.

NEVADA ARIZONA MINES CO.

ARIZONA

Near Hackberry, Mohave Co., Ariz. Is a silver-lead mine in the Music mountains, whose orebodies are said to show a little copper. Development includes the 200' Lucknow shaft and 700' Roosevelt tunnel, latter in milling ore for 200'. Company has erected a small concentrator expected to start work in Oct., 1913.

NEVADA BONANZA COPPER CO.**NEVADA**

Main office: 159 S. Main St., Salt Lake City, Utah. Mine at Morningstar City, Lyon Co., Nev. Freeman Morningstar, pres. and gen. mgr.; Sereno B. Tuttle, vice-pres.; Robt. J. Deighton, sec.; Walter C. Tuttle, asst. sec.-treas.; preceding officers, H. P. Clark, W. D. Mathis, Thos. J. N. Nippur, M. S. Woolley and P. L. Williams, directors. Organized 1906, capitalization \$2,100,000, shares \$1 par; issued, 1,448,000 shares in April, 1913.

Property, 12 claims, 7 patented, 250 acres, adjoining the Nevada Douglas ground, about a third of a mile from Ludwig station on Nevada Copper Belt railroad, in the Yerington district. J. C. Dick, E. M. of Salt Lake City, reports 3 fissure veins crossing property; 1 on the Green Dutchman about 5' wide and assaying \$38 in gold and 5% copper. The vein on the Copper King claim has been developed by a 3-compartment, 115' shaft, said to show copper ore its entire depth.

Property is still in the prospect stage, but management plans further development for 1913-14.

NEVADA BRITISH MINING CO., LTD.**NEVADA**

Idle. Mine address: Cherry Creek, White Pine Co., Nev. Alfred Fletcher, pres. and treas.; A. F. Dotterer, vice-pres.; Wm. F. Fletcher, sec.; J. W. Walker, gen. mgr. Organized 1907, under laws of Arizona, capitalization \$1,000,000, shares \$1 par, nonassessable. Shares are listed on the Salt Lake Stock Exchange. Lands, 6 claims, 3 patented, near Cherry on the Ely railroad, known as the Chief of the Hills group, west of the Adelaide Star Mine, Ltd., carrying lead and copper ores. Mine has shafts and tunnels aggregating 500'. In 1911 an upraise from 800 to 600' level, 1,000' from the shaft, cut a 7' vein of commercial ore. Company had lease with the Adelaide Star Mine Ltd., expiring June 18, 1913. Mine reported to contain \$200,000 worth of ore blocked out for stoping. As the Adelaide Star mine is leased to the Glasgow Western Exploration Co., the Nevada British lease is probably now held by that company.

Equipment includes a 40-h. p. gasoline hoist, 50-h. p. boiler and a small air compressor.

NEVADA-BULLION MINES CO.**NEVADA**

Address: Moe & Dougherty, San Francisco, Cal. Mine near Bullion, Elko Co., Nev. Company often called the Bullion-Nevada Mines Co., owns a group of claims adjoining the Nevada-Bunker Hill Mining Co. holdings and a half interest in the Kerr & Peterson lease on that company's ground.

Development consists of a tunnel now 1,970' long and being extended 200' further to cut the vein opened in old mine workings. Company has been shipping ore during Oct., 1913.

NEVADA BUNKER HILL MINING CO.**NEVADA**

Office: Elko, Nev. Mine at Bullion, Elko Co., Nev. J. A. McBride, pres.; Frederick Davis, vice-pres. and gen. mgr.; R. H. Mallett, sec.; John Henderson, treas.; preceding officers, John Zelch, L. H. Johnson and W. W. Booker, directors; Fred Diggs, supt. Organized April 28, 1905, under laws of Nevada, capitalization \$2,000,000, shares \$1 par; fully paid and nonassessable; 900,000 shares reserved in treasury for development, of which 16,180 have been issued. Annual meeting, first Wednesday in May.

Property consists of 21 lode claims, 9 patented, in Railroad mining district, 1 mile from Bullion P. O. and 14 miles from railway. Eight of the patented claims are held under bond and lease for \$109,000 until July 1, 1915, with 20% royalty. The country rock is limestone cut by porphyry dikes and with granite on either side. Ore occurs in the porphyry dikes and also in limestone and along contacts. There are 7 known orebodies, 2 being worked by leasers. Veins run north and south, are nearly vertical

and vary from 3 to 30' in thickness, are proven from 50 to 500' in length and to a depth of 600'. Ores are said to average 3% copper, 15% lead. 30 oz. silver per ton and a little zinc. Mine is an old one, having been discovered in 1869 and worked until 1893.

Development is by a 700' shaft and a 2,028' tunnel driven to open the old workings of the Blue Bird mine with other tunnels of 350', 250', 1,200', 2,000' and 1,000'. There is also a 200' and a 300' shaft on the property. Total development is reported as 13,800'.

Production for 1912 was 300 tons of 3% copper ore. The Nevada Bullion Mine Co. and the Sweepstakes property adjoin the mine. Manager states main working tunnel will be carried on to the 3,000' point which will be 500' below the 300' Tripoli shaft, an incline sunk on ore. In September last, the long tunnel cut and followed an iron seam that opened after 50' into a 1 to 4' streak of 35% lead ore with copper values. Leasers are mining ore at several points on this property.

NEVADA-BUTTE MINING CO.

NEVADA

Martin Benson, president. Organized 1913, capitalization \$1,000,000 shares 25 cts. par. Property, 15 claims in Dolly Varden and Mizpah districts, Elko Co., Nev. Claims are 75 miles from Ely and said to be on the northern end of a great belt of mineralized porphyry and to carry fissure and contact deposits. Development, by several shallow shafts, shows mineralization, but property still in prospect stage. Drilling on neighboring areas has shown commercially mineralized porphyry.

NEVADA-CALUMET COPPER CO.

NEVADA

Address: W. H. Bray, mgr., Battle Mountain, Elko Co., Nev. F. D. Nowell, pres.; J. A. Beck, vice-pres. and sec. Organized 1913. Property, the Boyd-Martin group, 30 claims, in heart of the monzonite-porphyry belt of Battle mountain, shows copper-stained patches thought to represent the outcrop of a big disseminated glance deposit. Company plans drilling property in winter of 1913-14.

NEVADA-CALUMET COPPER CO.

NEVADA

Office: 157 State St., Bridgeport, Conn. Mine office: Wabuska, Lyon Co., Nev. Thos. Malcolm, pres.; John L. Washing, vice-pres.; Arnold Schaer, John D. Kazar, William E. Blanchard, Chas. E. Hayes, Everett C. Elwood, Geo. E. Crawford, Thomas Malcolm, John L. Washing, J. Frank Cox, Francis E. Higgins and J. O. Brigham, directors; Philip J. Stacey, supt. Organized May 4, 1907, under laws of Arizona, capitalization \$2,000,000, shares \$5 par.

Lands, 17 claims, patented, 340 acres, 6 miles northeast of Buckskin and about 10 miles northwest of Yerrington. Property shows diorite, porphyry and silicious limestone, and has 3 contact deposits, estimated at 12', 30' and 40' average width, traceable 500 to 1,200', showing cuprite, malachite, azurite, chalcocite and chalcopyrite, giving assays of from a trace to 18% copper, and low average gold values. Development is by 2 main shafts, 1,200' apart, to be connected on the 500' level. About 225' of laterals, on the 500' level, show small bunches and stringers of ore, in a leached zone, with fair indications of workable values at greater depth. Equipment includes two 25-h. p. Witte gasoline hoists, and there is a 20-room boarding house, with 4 other buildings.

NEVADA CENTRAL COPPER CO.

NEVADA

Office: Room 1012, 122 So. Michigan Blvd., Chicago. Mine office: Cedar, via Palisade, Eureka Co., Nev. Robert L. Benson, pres. and treas.; Geo. Leighton, vice-pres.; A. F. Bordwell, sec.; preceding officers, Jos. D. Wright, E. L. Wilson, S. E. Oberlin, Wm. R. Andrews and Charles Lay, directors; Harold A. Linke, M. E., mine mgr. Organized Dec. 20, 1904,

under laws of District of Columbia, capitalization \$1,000,000, shares \$10 par, in \$250,000 non-cumulative 7% preferred stock and \$750,000 common stock. Issued, \$750,000 common. Annual meeting, second Tuesday in January at Washington, D. C.

Lands, 32 claims, about 700 acres, near Cedar, in the Antelope district. Litigation over titles was settled in the federal court of appeals, San Francisco, the Nevada Central securing clear title to the former property of the Whalen Consolidated Copper Co. Development is by a 500' incline shaft, with 1,000' drifts on Prince of Wales mine, cutting an 8' vein on the 100' level, showing copper of good average assay tenor. Two carloads of ore gave returns of 11% copper. There is also a 470' (June, 1913) vertical double-compartment shaft being sunk on the Henry mine. Equipment includes one 60 and one 12-h.p. gasoline hoist, air compressor and electric drill. Engine house was burned in July and work shut down, but operations were resumed Oct., 1913.

NEVADA CHAMPION COPPER CO.

NEVADA

Idle. Letters unclaimed at Goldfield, Nev., and Mina, Mineral Co., Nev. Wilson H. Scott, pres.; W. F. Miller, vice-pres.; C. M. Miller, sec-treas., at last accounts. Organized 1907, under laws of Arizona, capitalization \$7,500,000, shares \$5 par.

NEVADA CONSOLIDATED COPPER CO.

NEVADA

Office: 165 Broadway, New York. Operating office: McGill, White Pine Co., Nev. Mine near Ruth, White Pine Co., Nev. Silas W. Eccles, pres.; Col. Daniel C. Jackling, vice-pres.; W. E. Bennett, sec.; preceding officers, S. R. Guggenheim, Judd Stewart, Murry Guggenheim, J. N. Steele, Col. Chas. Hayden, Wm. B. Thompson, Chas. M. MacNeill and W. Hinckle Smith, directors; C. K. Lipman, treas.; C. B. Lakenan, gen. mgr.; E. E. Vanderhoef, mine supt.; G. F. Waddell, mill supt.; S. S. Sörensen, smelter supt.; Pope Yeatman, cons. engr.

Organized Nov. 17, 1904, under laws of Maine, as a merger of the Boston & Nevada Copper Co. and White Pine Copper Co., capitalization \$5,000,000, shares \$5 par; increased Feb. 5, 1908, to \$8,000,000, shares \$5 par, and again increased Nov., 1909, to \$10,000,000, shares \$5 par, non-assessable. A former issue of \$3,000,000 first-mortgage 6% convertible gold bonds, due April, 1918, has been retired.

Statement of Dec. 31, 1912, gave cash on hand \$739,951, and metals on hand and in transit \$2,886,660, with accounts receivable \$437,562 and accounts payable of \$577,998. Dividend rate is 37½ cts. per share quarterly, begun Oct., 1909, and dividends, 1910 and 1911, were \$1.50 per share, \$2 in 1912 and \$1.50 in 1913. Old Colony Trust Co., Boston & Guaranty Trust Co., New York, registrars; Boston Safe Deposit & Trust Co., Boston, and C. E. Beach, New York, transfer agents. Shares listed on the New York and Boston stock exchanges. Annual meeting, third Friday in April.

Earnings for 9 months in 1913 were but half those of 1912 and if allowance is made for depreciation, the balance of \$95,159 is a debit one after dividends are paid. Undivided profits are \$2,953,325, but quick assets are actually \$3,582,852, or nearly \$2 a share.

Company absorbed the Cumberland-Ely Copper Co., paying \$7,554,084 cash therefor, and took possession Aug. 30, 1910. Shareholders of the Cumberland-Ely were given the opportunity of exchanging stock on the basis of 3¼ shares for 1 share Nevada Consolidated. The Nevada Consolidated is controlled through stock ownership, amounting to 1,000,500 shares by the Utah Copper Co. The Nevada Consolidated Copper Co. controls through stock ownership the Nevada Northern Railway Co., having a line 168 miles long, running from the mines to the smelter and concentrator and from,

Ely to Cobre station on the Southern Pacific railway, and controls, through stock ownership, the Steptoe Valley Smelting & Mining Co. The company had 7,300 shareholders Feb., 1913.

Lands, 111 claims, patented, 1,379 acres, including the former holdings of the Cumberland-Ely, 48 claims, of 523 acres area. Property includes the Copper Flat or Eureka group of 355 acres; the Ruth group of 455 acres; the Lane group of 46 acres; the Veteran group of 14 claims; the Jupiter group of 22 claims, and a group of 12 claims near the Giroux Consolidated. Mineral lands include properties formerly held by the White Pine Copper Co., Cumberland-Ely Copper Co., and sundry other corporations and individuals.

The geologic features of the property are somewhat similar to those of Morenci, Ariz., and Bingham, Utah. An area of Paleozoic limestone is intruded by a great mass of monzonite porphyry tilting the sedimentary rocks and forcing its way into them in dikes and sills, heaving them up in great irregular lacoliths. At the surface the monzonite porphyry, which is the principal ore-bearing rock, is sparingly stained with small quantities of copper carbonates, not exceeding 0.5% in copper tenor and 25 cts. in gold, hence is worthless. Below the thoroughly oxidized zone, varying from 20 to 162' in thickness, the rock is no longer leached, but carries specks of copper glance in white altered porphyry. This disseminated chalcocite also occurs in tiny seams in partially brecciated material and as patches disseminated through the rock mass.

The zone of payable ore extends 200 to 300' below surface and below that depth the chalcocite impregnations become too lean for commercial use, the bottom limits of payable ore depending somewhat upon commercial factors, mainly the market price of the metal, as there is a gradual shading out of ore values with depth. The altered limestone also carries occasional impregnations of chalcocite, of commercial tenor. One portion of the property shows an extreme width of about 2,000' of ore.

A considerable part of the property is covered by a rhyolite capping, part of a lava flow that poured out over the district long after the monzonite intrusion and subsequent faulting and erosion. Two orebodies are mined by steam shovels, at Liberty and Copper Flat pits. The capping between these two orebodies has been removed and in time they will be mined as one.

The Copper Flat orebody covers an area of 3,600' long, 1,200' wide and averages 220' thick; the ore averages 1.67% copper, 3.5% iron, 0.5% lime and 80% silica. The actual yield from 1.53% ore was 19.47 lbs. copper in Aug., 1913.

Mining is mainly by steam shovels, working in open pits, and principally from the Copper Flat and Liberty mines, which have mammoth pits. The company has 6 dumping sites for material stripped from the Copper Flat and other pits, these sites having room for the deposition of about 11,000,000 cu. yds. of capping, giving sufficient room for all capping.

The Copper Flat mine, formerly called the Eureka mine, was proven by underground workings and by drilling before mining by steam shovels began, but extraction is practically all opencast. The mammoth pit of the Copper Flat mine is about 2,500' long, 1,500' wide and 350' deep, with ore removed in 7 benches of about 50' each. The ore is soft and friable, but requires blasting, holes being put down by churn drills to average depth of about 50', drilled at intervals of about 20' and fired in series, each blast breaking tremendous quantities of ground. The Copper Flat pit was working 8 Bucyrus steam shovels, Feb., 1913, partly on overburden and partly on ore, these having dippers of 3½ cu. yds. capacity, loading 14,200 tons of ore in a

single day. The Copper Flat mine lies on a low rounded hill, with summit only about 150' above the flat through which the railroad enters the mine, and the rail line reaches the bottom of the pit by 4 spirals along the benches, having a length of about 5 miles. The railway track in the pit has a grade of 3 to 4%, and as depth is gained transportation becomes more difficult. The Copper Flat has four 60-ton and eight 45-ton locomotives, one 30-ton crane with 50-ton and 60-ton ore cars.

Carbonate ores from cappings of the Copper Flat pit are produced far in excess of the requirements of the Steptoe smelter, though a considerable tonnage is used for converter flux and a small amount is employed in the reverberatory furnaces, but the greater part of the carbonate ore is stored in a ravine northeast of the works, where a railroad fill of considerable size has been built entirely of ore to be leached at some future time. Water from the Copper Flat pit has been raised by a small electric pump.

The Liberty mine or pit near the Copper Flat is now stripped and open-cast mining began, 1913. Churn-drill borings indicated about 9,000,000 tons of ore in the Liberty that may be extracted opencast. One steam shovel is removing overburden at the Liberty and 1 in ore, Feb., 1913.

The Ruth mine includes the Ruth and Star Pointer mines, operated as one property and connected by a 2,700' tunnel, with an extensive electric haulage system hoisting through the Star Pointer shaft. The Ruth shaft, $1\frac{1}{4}$ mile from the Copper Flat pit, is 610' deep, sunk at an angle of 45°, with 2 compartments, 200' of its depth being in limestone, with levels opened at 120', 310', 520' and 610', and is equipped with a small steam hoist. This shaft, now used for ventilation, has been replaced by the Star Pointer shaft, 459' deep, which corresponds with the 520' level of the Ruth shaft with which it is connected on this level. Water is cared for by a 300-gal. pump. The average grade of ore in the Ruth mine is somewhat above that of the Copper Flat and the mine has developed about 8,000,000 tons of ore of 2.5% average grade, with small gold and silver values. The ore is soft and the mine is to be operated on the caving plan.

The Star Pointer, or the main working vertical shaft of the Ruth mine, is located about 250' west of the lime-porphyry contact, is 7' 6"x25' 6" in the clear and has 4 compartments, there being two 6x6' skipways, a 5x6' ladderway for pipes also and 7x9' timberway, handling loaded cars on cages. The shaft has a 140' steel headgear on concrete foundations. The main hoist is geared to a 300-h.p. General Electric induction motor, and has drums with 72" face running independently or in balance, raising 5-ton ore skips, working in guides, and there is a 75-h.p. 11x16" duplex hoist for the timber cage.

The Veteran mine, taken over from the Cumberland-Ely, was tested extensively by churn drilling and has an orebody of about 500x1,000' in section, of about 200' average depth, with indications that it is an isolated bunch of sulphide ore, lying on a shelf of limestone, in a trough that has protected the sulphide ores from oxidation and leaching. Development includes a tunnel, but is mainly by the 475' Veteran shaft, sunk in limestone. This has outside dimensions of 7' 6"x27' 6", being practically a duplicate of the Star Pointer shaft. The mine has its bottom level at 400' and is worked by top-slicing and caving, to which the blanket formation is excellently adapted. Equipment includes a 300-h.p. Denver Engineering Works electric hoist, with 6' drums, raising two 5-ton Kimberley skips, singly or in balance, good for 600' depth, and is operated by a 550-volt 3-phase current, with a steam hoisting plant in reserve, for emergencies.

Miscellaneous properties include a number of small mines and groups, on which more or less work has been done. The Kimberley group shows a promising area of mineralized porphyry, but is not extensively developed

and the capping is too thick for opencast work. The Wedge mine has a shaft showing some ore of about 3.5% copper average assay tenor. The Jupiter mine has 4 shallow shafts showing ore assaying up to 9% copper, but with an average of probably about 3%. The Turkey shows a comparatively thin bed of cupriferous porphyry, apparently of no particular promise, and the August and Boss of Nevada groups have not given indications of much value.

Electric power is used throughout, current being brought from the Steptoe smelter, at 40,000 volts, and stepped down to 550 volts by four 200-kw. transformers in a concrete station.

Buildings include a machine shop and warehouse at the Copper Flat mine, engine houses at the various shafts and an office, boarding house and bunkhouse and numerous dwellings at the Ruth mine.

Ore is shipped to the Steptoe smelter, at McGill, separately described under title of the Steptoe Valley Smelting & Mining Co., over a 27-mile standard-gauge railway, equipment including 275 self-dumping ore cars. This line is a part of the Nevada Northern railway having a standard-gauge line of 168 miles in length, running from the mines and Ely to a junction with the Southern Pacific railway at Cobre station, 3 miles east of Toano. The Nevada Northern Railway Co., controlled through stock ownership by the Nevada Consolidated, is capitalized at \$2,000,000, with a \$1,000,000 bond issue, at 5%, the line doing a general business in addition to handling the traffic of the Nevada Consolidated Copper Co. and the Steptoe Valley Smelting & Mining Co.

Reserves: Extensive churn-drill borings on the Copper Flat, Liberty, Veteran, Ruth and other properties, have proven a tonnage estimated Dec. 31, 1912, to be 38,853,351 tons of ore, averaging 1.66% copper and representing an ore supply of about 14 years, of which the major portion is in the Copper Flat and Liberty groups.

The cost of stripping overburden was given at 33.64 cts. per cu. yd. for the fiscal year ending Dec. 31, 1912, with actual mining costs for ore of 17.35 cts. per dry ton, with an additional charge of 15 cts. per ton made to cover stripping redemption at the Eureka pit, 22 cts. at Liberty pit and 30 cts. at the Hecla pit. Ore mined and treated during the fiscal year 1912 averaged 1.692% copper, by assay, with an average extraction of 68.25%. The ore mined and milled for the 3 months ending Sept. 30, 1913, was 813,153 tons, of which but 7% came from underground workings. This ore averaged 1.53% copper as compared with 1.76 for the previous quarter year and 1.67 for the mine average. The cost of production for the fiscal year 1912 was given as 8.33 cts. per lb. of copper and for the three-quarters of 1913, 10.09 cts., covering all charges, including depreciation charges on Steptoe plant. It is not probable, however, although the Nevada Consolidated Copper Co. is one of the largest and best mines in the world, that the mine can continue to produce copper, for any great length of time, at much less than 8 cts. per lb., and, when all factors are taken into consideration and due allowance is made for the cost of improvements, that ultimately must be charged against costs, a net cost of 9 cts. per lb. for finished copper laid down at the seaboard, would be a fair estimate. Production is marketed through the American Smelting & Refining Co., on a 1% commission basis.

Production was 33,283,348 lbs. fine copper in the fiscal year ending Sept. 30, 1909; 62,772,340 lbs. in the fiscal year 1910; 78,541,270 lbs. for the 15 months ending Dec. 31, 1911; 63,063,261 lbs. for the year ended Dec. 31, 1912, and 48,287,774 lbs. for the 9 months ending Sept. 30, 1913. The Nevada Consolidated is a mine of the first magnitude and is capable, with mill improve-

ments, to recover values in slimes, of making cheaper costs and larger production than was secured in the fiscal year 1912. The property has been splendidly developed and is being managed with ability and success.

NEVADA CONSOLIDATED MINES & SELLING CO. NEVADA

Office: 625 Market St., San Francisco, Cal. Mine office: Hawthorne, Mineral Co., Nev. Alex. Brown, pres.; Chas. L. Newton, vice-pres.; C. C. Matthews, sec.; F. G. Carey, treas. Lands, about 1,000 acres, including a gold property formerly owned by the Huntoon Valley Mining Co., 45 miles south of Hawthorne, and copper claims 10 to 20 miles southwest of Hawthorne. The copper property is being developed by a 650' tunnel said by the company to have a 17' vein carrying copper sulphides, with some galena. The company claims to have nearly 6,000' of workings. A 100-ton concentrator and a smelter, planned for 1909, were not built. Officers are said to stand well but the company's past advertising is not liked.

NEVADA CONTACT COPPER CO. NEVADA

Operated 1913, according to press reports. Letter unclaimed at Salt Lake City, Utah. Mine near Contact, Elko Co., Nev. Organized 1907, under laws of Arizona, capitalization \$1,000,000, by Chas. A. Berter, J. H. Roberts, A. G. Hudson and A. Naylor. Lands, 100 acres, showing 3 veins, said to be traceable 4,000', having a 40' shaft, from which picked samples give assays up to 28% copper, with an estimated average of 12 to 14% copper.

NEVADA COPPER CO. NEVADA

Mine near Yerington, Lyon Co., Nev. Lands are claimed to show a vein of 60 to 100' width, opened by a 330' main shaft. Company is said to hold the old Boston & Nevada smelter, across the river from Yerington. Idle some years and reported probably dead, 1913.

NEVADA COPPER CO. NEVADA

Office: 572 Bullitt Bldg., Philadelphia, Pa. Operating office: Tonopah, Nev. Mine office: Mina, Mineral Co., Nev. Jas. S. Austin, pres.; J. H. Whiteman, vice-pres.; C. A. Higbe, sec.-treas. Company is controlled by the owners of the Tonopah Mining Co. Owns the Dunlap mines near the Blue Light mine, 12 miles east of Mina. Claims show a great outcrop said to be 600 to 700' wide and much longer, carrying bornite and copper oxide in a lime-iron gangue. The property can be worked by open cuts. Property has very little development, but has a good plant with air compressor, etc.

Company is not the one of same name merged with Nevada Bell Copper M. & R. Co., 1904.

NEVADA COPPER CO. UTAH

Idle. Office: 222 D. F. Walker Bldg., Salt Lake City, Utah. Mine office: Smyths, Beaver Co., Utah. A. J. McMullen, vice-pres.; A. D. McMullen, sec.-treas. Organized April, 1907, under laws of Utah, capitalization \$1,000,000, shares \$1 par, assessable; issued, \$650,000. Lands, 14 claims, 4 patented, 12 miles from the S. P. L. A. & S. L. R. R., in the Beaver Lake district, show Paleozoic limestone cut by monzonite, with disseminated ore and replacements. The claims have several pits and shafts, deepest 175' with about 200' of laterals, said to show a vein assaying 8.5% copper and 111 oz. silver per ton. No returns secured.

NEVADA COPPER HILLS MINING CO. NEVADA

Office: 18 South Mulberry St., Mansfield, Ohio. Mine office: Luning, Mineral Co., Nev. A. H. McCullough, pres.; F. W. Lenhart, vice-pres.; T. J. Foster, sec.; Chas. Ritter, treas.; Rowland Lea, gen. mgr.; preceding officers, Geo. Lowery and W. J. Whillis, directors. Organized Oct. 24, 1907, under laws of Nevada, capitalization \$1,500,000, shares \$1 par, non-assessable;

issued, \$745,000. Farmers Saving & Trust Co., Mansfield, Ohio, registrars. Annual meeting, first Monday in December.

Lands, 10 claims, 200 acres, in the Fitting district, 9 miles north of Luning. The property is reported, by Mr. Lea, to have numerous replacement orebodies in limestone forming a series of parallel bedded veins over a width of about 600', these having a generally north-south strike, with a dip of 6°, carrying oxidized ores with occasional native copper; some bornite with chalcopyrite shows in the bottom workings. Veins average 2' thick and 28 of them are opened up for a length of 400' and a depth of 100', according to the company's secretary. Ore is stated to assay 1 to 70% copper, from a trace to 8 oz. silver and from a trace to \$3 gold per ton.

Development is by a 225' shaft and a 330' tunnel. Equipment includes a 25-h.p. hoist, and there are 6 buildings. Management plans extending the tunnel, deepening the shaft to 500', and crosscutting, also installing compressor.

NEVADA COPPER MINING, MILLING & POWER CO. NEVADA

Office: Tacoma, Wash. Mine at Contact, Elko Co., Nev. E. F. Mesinger, pres., Tacoma, Wash.; Henry Smith, vice-pres. and gen. mgr., Contact, Nev.; E. S. Price, sec.-treas.; M. K. Price and C. Smith, all of Tacoma, directors. Organized May 5, 1905, under laws of Arizona, capitalization \$1,500,000, shares \$1 par, nonassessable; issued, \$1,500,000.

Property, 52 claims, 16 patented, in Salmon River district, better known as Contact district, Nev. Claims show Paleozoic sediments cut by granite with orebodies along the contact. Company is now preparing for extensive development and several hundred tons of high-grade ore is at the Alice mine awaiting shipment by auto truck to Rogerson, Idaho, 40 miles away. Property and geology fully described Bull. 497, U. S. Geol. Survey.

NEVADA COPPER, PLATINUM & NICKEL CO. NEVADA

Office and mine: Bunkerville, Clark Co., Nev. Property is the Key West mine, or Great Western group, in the Bunkerville (Copper King) district, 38 miles northeast of Moapa, on the Salt Lake railroad. District shows limestone cut by volcanic lavas, with fissure veins. The working shaft is 300' deep and there are over 5,000' of underground development in tunnels and crosscuts. Made shipments in 1908 of ore said to average about 4% copper, 2.5% nickel and $\frac{1}{3}$ oz. platinum per ton. Idle several years.

NEVADA COPPER QUEEN MINE. NEVADA

A. C. James, supt., Luning, Mineral Co., Nev.; A. L. Van Tyne, Syracuse, N. Y., and associates, owners; John C. Skuse, cons. engr. Property, the Spanish Woman's group of 53 claims, 8 miles from Luning. Development work shallow, but leasers are now taking out ore at 6 places. Present owners bought property in Oct., 1913, and plan active development.

NEVADA DELAWARE MINING & MILLING CO. NEVADA

Idle. Mine office: Carson City, Ormsby Co., Nev. E. B. Sollenberger, pres.; A. M. Duncan, vice-pres.; J. E. Sollenberger, sec.-treas. and gen. mgr.; preceding officers, O. B. Taylor and F. B. Sharp, directors, at last report.

Organized under laws of Nevada, capitalization \$1,000,000, shares \$1 par. Lands, 3 claims, unpatented, 60 acres, 7 miles northeast of Carson City, the nearest rail point. Mine, developed by a crosscut tunnel, with about 2,000' of workings, has oxidized silver-copper ores, with some free gold, a test shipment to a Salt Lake smelter assaying \$32 per ton giving net returns of \$7 per ton. No returns secured.

NEVADA DELKER COPPER MINING CO. NEVADA

Idle. Office: Cherry Creek, Nev. Walter F. Rock, pres.; J. W. Walker, vice-pres., treas. and gen. mgr.; A. C. Krez, sec.; W. D. Clements, supt., at last accounts. Organized July, 1910, capitalization \$1,000,000, shares \$1 par.

Lands, 23 claims, 460 acres, 20 miles west of Currie, having an ore zone of 400' claimed width, developed by a shallow 2-compartment shaft planned to be sunk 400' to the sulphide zone. A test shipment of surface ore gave returns of 14% copper and \$3 gold per ton.

NEVADA-DENVER COPPER CO.

NEVADA

Address: Yerington, Nev. C. C. Warrell, pres.; Geo. D. Suter, Denver, vice-pres. and gen. supt.; O. L. Stiles, Denver, sec.-treas.; Paul Esch, Milwaukee, Wis., C. C. Werts and C. A. Hilton, Denver, and A. W. Gardiner, directors. Organized Sept., 1912, under laws of Nevada, capitalization \$250,000. Property, the Juanita group, 4 claims adjoining the Honest Endeavor mine in the Yerington district, Nev., which belongs to same owners and is a few miles northeast of the Nevada-Douglas mines. Claims said to show veins with 4 to 16% ore in granodiorite. Development is slight, consisting of shallow tunnels, cuts and pits. Property idle, Sept., 1913, on account of liens filed by former employee and title said to be still in the name of Suter and Hilton.

NEVADA DEVELOPMENT CO.

NEVADA

Idle. No response from office: 201 Walnut Place, Philadelphia, Pa. Mine at Lovelock, Humboldt Co., Nev. Theo. H. Lowe, supt., at last accounts. Lands are the Copper Glance group and adjoining claims.

NEVADA DOUGLAS COPPER CO.

NEVADA

General office: 79 Milk St., Boston, Mass. Main office: Newhouse Bldg., Salt Lake City, Utah. Mine office: Ludwig, Lyon Co.; Nev. A. J. Orem, pres.; James G. Berryhill and L. H. Curtis, vice-presidents; F. M. Orem, sec.-treas.; W. C. Orem, gen. mgr.; preceding officers, J. J. Corum, Jos. T. Herrick, directors; Archie J. Orem, supt.; H. L. Burbridge, mine supt.; Llew Humphreys, mg. engr.; E. R. Marble, assayer; R. M. Mitchell, Salt Lake City, Utah, purch. agt. Organized Sept. 1, 1906, under laws of Utah, capitalization \$5,000,000, shares \$5 par, fully paid, nonassessable; 930,000 shares issued. Bonds, \$600,000, 6%; \$500,000 outstanding. Dividends, 1913, \$125,000. Federal Trust Co., Boston, registrar; Paul Revere Trust Co., Boston, transfer agent. Stock listed on Boston curb. Annual meeting, second Tuesday in May.

The report for the year ending Dec. 3, 1912, shows a gross operating revenue of \$824,891, while operating expenses were \$390,077, leaving a gross operating profit of \$434,814. Deducting \$164,657 for fixed charges of mine depreciation, there is a net profit of \$270,157 for the year.

The company has decided to dispose of its half interest in the Nevada Copper Belt Railroad Co. and has sold for \$100,000 the railroad company's note and surrendered 5,000 shares of railroad stock for 50,000 shares of its own stock, which are returned to the company's treasury, this action being due to recent laws enacted in the state.

Lands, 30 claims, 550 acres, with 2 mill sites aggregating 80 acres, and miscellaneous lands, including water rights, giving total holdings of about 700 acres on the western slope of the Mason mountains. Lands include former holdings of both the Ludwig Copper Mining Co. and the Douglas Copper Mining Co., which succeeded the Douglas Mining & Smelting Co. Holdings consist of 4 separate and distinct mines, the old Douglas mine, the Amalgamated group and the Casting Copper mine, being the original holdings of the company, and the Ludwig mine, which was more recently purchased. Country rock consists of limestone intruded by grano-diorite, with large contact orebodies and fissure veins. There also is one claim carrying fluxing ore at Buckskin, 7 miles distant.

The Ludwig mine, about 1 mile northwest of the Douglas, includes 2 claims, on which the mine is opened, and a 40-acre tract in Smith Valley,

on which there is a well and pumping station. The Ludwig was opened 1865, and work by the former owners was badly planned, but the property was a shipper for some years of small quantities of high-grade ore, production including some very handsome malachite and azurite, a portion of which was sold to lapidaries, and considerable bluestone was produced also for the mines of the Comstock Lode.

The ore occurs in a fissure vein with a white limestone footwall and a silicious limestone hanging wall, which changes to a garnetiferous limestone, heavily impregnated with sulphides in places. Where crushing has permitted surface waters to work downward, large bodies of carbonates and copper glance ores are found as replacements in the footwall limestone. The vein proper has an average width of about 30' and has been developed along its course for 1,300' and to a depth of 910' by levels, along hanging wall, every 100'. The orebody on the 700' level is 50' wide and 300' long and runs 6% copper. The shoots, or pipes, of high-grade secondary ore, running from 16 to 30% in copper, form chamber deposits in the limestone near the porphyry contact, proven down to 800' level. Ore reserves are estimated at 400,000 tons of 5% copper ore.

In addition to copper ore, the Ludwig has a very large deposit of gypsum, on the footwall, said to be 3,000' long, 500' wide and 400' deep, which figures seem high. This deposit of gypsum is already of commercial value, and was being mined and shipped at the rate of 50 tons a day in 1913.

The Douglas mine is working a typical contact metamorphic deposit in which garnetized limestone carrying copper sulphides and their resultant oxidized ores occur in very irregular orebodies in limestone which have a tendency towards a horizontal rather than a vertical extension. The mineralized area is about 700' wide and 2,000' long with numerous parallel fissures which seem to control the mineralization. This mine has been developed by a main working tunnel and a deeper haulage tunnel with numerous crosscuts and drifts netting the property. The working tunnel, 4,290', has an average depth of 120' beneath the surface and the ore is in places continuous to the surface. Four 50' winzes show the downward extension of the ore.

The Casting Copper mine shows a large area of garnet-epidote limestone constituting low-grade carbonate ore, which will be extensively mined. This mine has a 350' vertical shaft and a 500' tunnel. In 1913 three levels, 100', 200' and 350', were being developed but little work was being done on the latter. The 100' level shows an orebody 50' wide and 175' long and shipments average 5% copper as compared with 3% in the Douglas mine.

At the Amalgamated mine very little development work has been done, but the surface exposures indicate the existence of similar large contact metamorphic deposits.

Property as a whole has 21,362' of workings. Equipment includes four 100-h.p. hoists, good for 1,000' depth each, with a 52-drill Imperial air compressor. Electric current is taken from the Truckee River General Electric Co. Water is secured from artesian wells in Smith valley, brought to the mine by a 17,000' pipe line.

Company has canceled its smelting contract with the Mason Valley smelter, having been discontented for some time with the smelting rates, which made it necessary to mine only the richer ores of Douglas hill. At the present time it has built an experimental leaching plant at Denver, Colo., of 20 tons capacity, using the Greenewalt wet process, ore being crushed to 16 mesh, leached with a 12% solution of sulphuric acid and precipitated by electrolysis. A 90% extraction has been made by W. L. Austin,

who is in charge of this plant. A 1,000-ton leaching plant will be erected at the Ludwig mine.

Company employs about 243 men, whose daily wage averaged \$3.41, and has a school house, store, club, etc.

Ore mined in 1912 from the Ludwig and Douglas Hill mines amounted to 331 tons per day, or 120,908 tons, averaging 4.25% copper, yielding 9,020,640 lbs. fine copper. Output for 1913 estimated by management at 12,000,000 lbs. Latest production, Aug., 1913, was 3,839 tons of 4.62% ore and in Sept., 1913, 3,491 tons of 6.1% ore.

NEVADA ELY COPPER CO.

NEVADA

Idle many years and probably dead. Office: Exchange Bldg., Colorado Springs, Colo. Letter unclaimed at Ely, White Pine Co., Nev. J. W. Yates, pres.; J. O. McClain, vice-pres.; O. P. Grimes, sec.-treas. Organized 1907, under laws of Arizona, capitalization \$3,000,000 shares \$1 par, nonassessable. Lands, 7 claims, including the Timberline group of 3 claims and the Copper Bottom group of 4 claims, on which some diamond drilling was done in 1907.

NEVADA EXPLORATION & MINING CO.

UTAH

Idle. Office and mine: Bingham Canyon, Salt Lake Co., Utah. Organized 1907. Lands, 15 claims, near the Eagle Bird Mining & Milling Co., in Barney canyon, in the northern part of the Bingham district. Development is by a tunnel being driven jointly with the Utah Mining & Milling Co. No returns secured.

NEVADA MINES CO.

NEVADA

Address: Geo. E. Stone, 74 De Long Bldg., Philadelphia, Pa. W. G. Hay, pres.; Hayden Whitney, vice-pres. Mine address: Imlay, Humboldt Co., Nev. Is a reorganization of the U. S. Gold & Copper Corporation and Par Value Consolidated Mining Co., both stock-selling propositions that drained Wheeling and Moundville, W. Va., investors.

New company organized 1911 under laws of Arizona, capitalization \$2,500,000, shares \$1 par, nonassessable; 1,000,000 shares and \$4,000 cash paid for properties. Stock was sold at 5 cts. a share to stockholders of old companies.

Property, 8 claims, 160 acres, in the Humboldt range, 4 miles from Humboldt, Nev., developed by 700' tunnel and drift work, showing lead and copper ore. Not regarded favorably.

NEVADA MINING CO.

CALIFORNIA

Probably closed down. Mine near Auburn, Placer Co., Cal. L. G. Schuster, mgr., at last accounts. Lands, 150 acres in Placer county and 30 acres in Nevada county, former 8 miles from nearest railroad, at Auburn, with a good wagon road connecting. Development by 2 shallow 2-compartment incline shafts, in a vein reported as diorite in slate, carrying malachite and chalcopryrite, associated with pyrite and hematite.

NEVADA ORE COPPER CO.

NEVADA

C. Greeman, supt., Acme, via Mina, Mineral Co., Nev. Property, a group of claims in the Fitting district, said to show copper ore in replacement deposits. Developed by 1,000' shaft and extensive workings, opening up lead ores. Shaft to be deepened to 1,500' in 1914.

NEVADA PACIFIC MINES CO.

NEVADA

L. P. Patrick, pres., Goldfield, Nev. Mine office: Mina, Mineral Co., Nev. Property, the Mayflower group in New York canyon, northeast of Mina, shows copper ore 150' wide, exposed by surface work, from which 15 tons daily are shipped to the Wabuska smelter. Development work is in progress to prove up the property, which is regarded by observers as a steam-shovel proposition.

NEVADA PHCENIX MINING CO.**NEVADA**

Idle. Letters sent to Beowawe, Eureka Co., Nev., unclaimed. Lands, 22 claims, south of Beowawe, are opened by a shallow 2-compartment shaft and a 300' crosscut tunnel, showing a 3' vein said to give average assays of 7.2% copper, 55 oz. silver and \$16 gold per ton.

NEVADA QUEEN COPPER CO.**NEVADA**

Idle. Office: 405 Mining Exchange Bldg., Colorado Springs, Colo. Mine near Yerington, Lyon Co., Nev. Duncan Chisholm, pres.; John Matthew, vice-pres. and treas.; R. G. Riddett, sec.; preceding officers, H. Hieronemus and D. P. Randall, directors. Organized Oct. 5, 1906, under laws of Colorado, capitalization \$1,500,000, shares \$1 par, nonassessable; issued, \$1,107,350. Is operated as a close corporation. Annual meeting, second Monday in October. Lands, 28 claims, patented, 467 acres, lying immediately north of the Nevada Douglas and Yerington Central Copper companies, developed by shafts of 186' and 210', showing copper ore giving assays of 1.5 to 28%. Management planned operating in 1913.

NEVADA SM. & MINES CORPORATION. CALIFORNIA & NEVADA

Office: Room 515 E, 30 Church St., New York. Mines near Tybo, Nye Co., Nev. Max E. Bernheimer, pres.; L. A. Dessar, vice-pres.; Werner Mueller, sec.; A. W. Joseph, treas.; preceding officers, M. Eisenberg, Chas. Lee, L. E. Marsden, N. P. Payne, H. Rawitzer, C. J. Roberts, directors. Organized May, 1906, under laws of South Dakota, capitalization \$5,000,000, shares \$5 par. Stock listed on the New York curb. Empire Trust Co., New York, registrar. Company has abandoned its copper claims at Greenwater, Cal., and now owns a controlling interest in the Tybo Consolidated Mining Co., owning silver-lead properties at Tybo, Hot Creek district, Nev.

NEVADA STANDARD COPPER CO.**NEVADA**

C. Wilbert E. Marsh, pres., Mina, Nev. Organized under laws of Nevada, capitalization 100,000 shares; 55,000 issued for property and 9,220 sold for development funds.

Property, 12 claims and a mill site located in the Santa Fé or Luning district, Mineral Co., Nev. Claims cover low rounded hills at about 6,000' elevation, lying 6 miles east of Luning with good wagon road. The rocks are leached porphyries showing traces of copper and underlain at 20' depth by low-grade oxidized copper ores.

Development consists of 104' shaft on the Green Mystery claim and various location pits and tunnels. A level at 104' cuts a 24' shear zone carrying low-grade ore. Owner considers it a typical porphyry, or disseminated copper deposit. Equipment includes a 4-h. p. gasoline hoist, blacksmith shop and buildings for men. There are 3 springs, 2½ to 5 miles distant.

NEVADA UNITED MINING CO.**NEVADA**

Main office: Lovelocks, Humboldt Co., Nev. Oliver G. Jennings, pres. and treas.; David R. Fowler, sec., both of 51 Wall St., New York; Wm. J. Griffiths, vice-pres.; John T. Reid, gen. mgr. and mg. engr.; preceding officers, Louis C. Naisawald, Louis J. Mukel and Ed. M. Burghard, directors; Chas. Sauberg, mine supt. Organized 1906, under laws of Arizona, capitalization \$200,000, increased later to \$300,000, shares \$1 par, fully paid and nonassessable; 240,000 shares issued. Annual meeting, first Thursday in February.

Lands, 33 claims, 10 patented, 550 acres, and a 60-acre mill site, 35 miles southeast of Lovelocks, 16 miles from Boyer, the nearest post office, and in the White Cloud district of Churchill county, Nev. The district shows Triassic sediments cut by granite-porphyry and covered in part by volcanic rocks. The ore deposits occur as replacements in limestone and as contact

metamorphic orebodies. The claims show limestone, with 4 orebodies, having gossans of cupriferous, specular hematite, carrying oxidized ores in the gossan and sulphides at depth. The vein runs E.-W. and has a dip of 70°. The copper deposit is said to average 4½% copper. The zinc vein is 20' wide, where cut in a 1,300' tunnel, and averages 5½% zinc.

The mine has shafts of 40', 60', 70' and 120', and 5 tunnels, the longest a crosscut of 3,050', with back of about 1,000', and 1,050 of crosscuts; the final 250' of tunnel is in an ore zone of iron oxide, 100' wide, with irregular bunches of copper ore assaying 2.5%. Workings estimated by manager to show 10,000 tons of ore, with 1,000 tons blocked out for stoping. The mine, which was worked 1871-73, and again 1889-95, was reopened, 1906, by the present management, and is quite wet, about 700,000 gals. of water daily flowing from the tunnel.

Equipment includes a 160-h.p. steam plant, with a hoist good for 750' and a 3-drill Ingersoll-Rand air compressor. There are 10 mine buildings.

NEVADA-UTAH MINES & SMELTERS CORP. NEVADA & UTAH

Reorganized and entire assets taken over by Consolidated Nevada-Utah Corporation of Virginia and properties described under that title. The old companies affairs are fully described and criticised in Vol. X. The schedule in bankruptcy, filed Feb., 1912, showed liabilities of \$185,033, with \$21,500 secured by a Salt Lake bank and \$40,000 by the Bristol Consolidated Mining Co. The assets included \$222,341 due from the Nevada-Utah Mining Co.; \$17,434 from the Imperial Gold & Copper Mining Co., and \$10,831 from the Consolidated Pioche Mining Co. On June 11, 1912, the entire assets were bought for \$102,000 at a judgment sale by a reorganization committee for a new company called the Consolidated Nevada-Utah Corporation, organized under the laws of Nevada.

The secretary states "About 50% of the old company's shares, totaling 1,500,000, paid the 50-ct. assessment, thereby making available for carrying out reorganization approximately \$350,000. The properties were bid in at receiver's sale for \$102,000, while approximately \$100,000 additional was spent in corraling other collateral, including shares of subsidiary companies. This left available for reorganization and development work about \$150,000. The new company has 2,000,000 shares, par \$3, and \$900,000 income bonds. The new management has pledged itself to carry forward an extensive program of development work and has retained as consulting engineer Allen H. Rogers, who some months ago made an examination of the property.

"None of the executive officials will draw salaries until the property has demonstrated that it can pay them from earnings. Some of the upper levels of the property at Pioche have been leased since last July and between 20 and 30 cars of ore monthly have been shipped on a royalty basis.

"The new management has been practically assured that concentrates running 1½ into 1 should yield a value of over 40% zinc, thereby netting a substantial profit per ton, after an \$8 freight charge to smelter.

"A period of fully 8 months will elapse before the program mapped out for the development work will be completed."

The Last Chance group of 14 claims at Bingham, Utah, said to have produced \$1,500,000 and developed by a 3,200' tunnel, is reported sold Oct., 1913, for \$100,000 to the U. S. Smelting, Refining & Mining Co.

NEW ARCADIAN COPPER CO. MICHIGAN

Office and mine: Houghton, Houghton Co., Mich. Robt. H. Shields, pres. and gen. mgr.; Col. Sylvester T. Everett, vice-pres.; Wm. F. Miller, sec.-treas.; preceding officers, Wm. B. Anderson, John Merton, John C. Shields, L. W. Killmar, Jas. W. Shields and Allen F. Rees, directors; Herman W. Fesing, engr.; Otto Lieber, mg. capt. Organized April 27, 1909,

under laws of Michigan, capitalization \$3,750,000, shares \$25 par, assessable; paid in, \$11.50. Last assessment, 50 cts., was paid July, 1913. This company succeeded the Arcadian Copper Co., a corporation organized under the laws of New Jersey that had nonassessable stock, and exchanged shares, *pari passu*, levying an assessment of \$1 per share, 1909. Property was transferred, by deed, from the old company to the new, May 30, 1909. Company owns 10,000 shares of stock of the New Baltic Copper Co. Boston Safe Deposit & Trust Co., registrar; American Trust Co., Boston, transfer agent. Annual meeting, first Tuesday in May.

Lands, 3,500 acres, including 3,200 acres of mineral lands, all freehold. Property includes 5 old mines worked in a small way at various periods in the past. The Arcadian Copper Co., predecessor of present company, operated the property with great vigor, 1898-1901, and equipped it with magnificent buildings and machinery, including a 3-stamp mill at Grosse Point. Operations on the Isle Royale bed proving unsatisfactory all work was suspended June 15, 1903, the hoist, machinery and shaft houses were sold to the Trimountain Mining Co., the stamp mill was sold to the Centennial Copper Mining Co. and the mine buildings disposed of to various purchasers, the property being almost completely dismantled. The floating debt of the old company was liquidated by the sale of 800 acres of land, for \$750,000, to the Quincy Mining Co. The old mine and equipment were fully described in Vols. I and II.

Exploratory work was resumed Oct., 1905, by the old company, on an amygdaloidal bed about one-fourth mile east of the Isle Royale amygdaloid previously worked, and crosscutting from the 200' level of the exploratory shaft disclosed 5 cupriferous beds in a distance of 110'. Work was suspended March, 1908, until organization, and was resumed Aug., 1909, by diamond-drill boring from the bottom of the 200' exploratory shaft, which is in the S.W. $\frac{1}{4}$ of Sec. 29. Exploratory work, 1910-12, included considerable trenching and test pitting, but was devoted mainly to securing 3 cross-sections, nearly 1 mile apart, by diamond drilling, and 26 holes, aggregating over 26,000', had been drilled to end of 1913. Drill hole No. 22 cut a promising amygdaloid lode, in the north area. A shaft started June, 1912, on this lode, was 750' deep Sept., 1913, is to be sunk to a depth of 1,500 to 2,000'. Crosscutting was being done in October, after 3 months' idleness due to the strike, on the 700' level to explore the 2 copper-bearing amygdaloid beds disclosed by diamond drilling, one 300' east, the other 150' west of the shaft.

Equipment includes a steam plant, with boilers, a hoist good for 1,500' and a 15-drill air compressor, and there are necessary mine buildings. Owing to its immense acreage on the mineral belt, the property is considered promising, notwithstanding its lack of success under the old company, and management is good.

NEW ATLAS MINING CO.

YUKON TERRITORY

Wilbur D. Greenough, care Greenough Bros., Spokane, Wash., chief owner and gen. mgr.; J. F. Berger, supt., White Horse, Yukon Territory, Can. Property, the Yukon-Pueblo group, shows deposits of silver-bearing copper ore, developed by shaft work, with a force of 85 men at last accounts. Has steam plant.

NEW BALTIC COPPER CO.

MICHIGAN

Office: Houghton, Mich. R. H. Shields, pres. and gen. mgr.; Jas. P. Edwards, vice-pres.; John Edwards, sec.-treas.; other directors, S. J. Beahan, J. C. Shields and John Merton; Herman Fesing, engr. Organized Dec. 14, 1909, under laws of Michigan, capitalization \$2,500,000, shares \$25 par, assessable; issued, \$1,750,000; \$8 paid. Company succeeded the New Baltic

Exploration, giving stockholders therein share for share, giving 30,000 shares to the Edwards estate and 10,000 shares to the New Arcadian Copper Co., for lands, and selling 20,000 shares to the public, at \$8. Company began operations with \$120,000 cash, and ended 1912 with a cash balance of \$23,576. All officers with exception of general manager serve without pay. Annual meeting, third Wednesday in April.

Lands, 640 acres, being Sec. 16, T. 55 N., R. 33 W., with mineral rights to the N.W. $\frac{1}{4}$ of the N.W. $\frac{1}{4}$ reserved by the New Arcadian Copper Co. Exploratory work, begun June 10, 1909, included extensive trenching in the horizon of No. 3 conglomerate, supplemented by boreholes put down by a Calyx shot drill, cutting a $3\frac{1}{2}$ " core, considerable trouble having been experienced in getting down stand pipes. No. 3 borehole, at depth of 330', cut 2' of exceptionally good copper-bearing rock, with 6" of heavy copper, and a drill core fairly charged with copper was taken, Sept., 1909, from what was thought to be the western Baltic bed, at depth of 300'. In Nov., 1909, a drill hole pitched at an angle of 60° cut an amygdaloidal bed estimated to pitch at 60° in opposition, giving cores of 105' aggregate length, showing copper at various points, the final 7' being well charged with fine stamp copper and a considerable amount of very coarse stamp copper. The drilling also disclosed an unidentified amygdaloidal bed of about 75' width, carrying considerable copper in masses approaching barrel-work size. Deepest hole bored was 1,200'.

Ground was broken June, 1910, for an exploratory shaft, which was started about 35' in the footwall trap, and this shaft was 500' deep, Sept., 1913. Although the shaft was started in the foot, the formation rolls so that the bed was cut at 3 points in the depth of 310'. At 200' the shaft cut the footwall of the amygdaloidal bed, of kindly appearance, carrying much calcite but devoid of copper. At depth of 310' the bed was cut again, carrying extremely heavy copper of a grade materially better than the average of the payable mines of the district. Drifts on the 350' and 500' levels disclose exceedingly bunchy ground, with occasional pockets of rich copper, and a crosscut on the 500' level shows further copper ground in an unidentified amygdaloidal bed underlying No. 4 conglomerate bed, distant about 1,500' from the shaft.

Equipment includes a temporary frame shaft house. The steam plant has a Cleaves hoist, good for 1,500', and a 6-drill Ingersoll-Sergeant air compressor. Property considered promising and management good.

NEW BINGHAM CONSOLIDATED MINING CO.

UTAH

Idle. Mine near Bingham Canyon, Salt Lake Co., Utah. Jesse Knight, pres., Provo, Utah; Wm. W. Mathews, vice-pres.; W. Lester Mangum, sec-treas.; Wm. Christopherson and J. Wm. Knight, directors; J. Knox, mgr., at last accounts. Organized Jan., 1907, under laws of Utah, capitalization \$100,000, shares \$1 par. Lands, 6 claims, in the northern part of the Bingham district.

NEW BOSTON MINING CO.

MONTANA

Office: 117 North Montana St., Butte, Mont. Mine office: Corbin, Jefferson Co., Mont. Jas. A. Davidson, pres. and gen. mgr.; Hugo Traylor, sec-treas., at last accounts. Capitalization 600,000 shares, \$1 par. Company owns 6 full and 2 fractional claims adjoining the Boston & Corbin, said to carry upwards of 20 different veins. The Daphne claim, patented for 30 years, carries a 5' vein with a 16" paystreak assaying 10.5% copper, 42 oz. silver and \$3 gold per ton, balance of vein being claimed to assay about 3% copper.

NEW CHICAGO MINING CO., LTD.

IDAHO

Letters neither answered or returned from Wallace, Idaho. Mine near

Murray, Shoshone Co., Idaho. Mrs. Elise Heller, pres. and treas.; N. E. Hanson, vice-pres.; Geo. H. Heller, sec. and gen. mgr.; preceding officers, Walter H. Hanson and Frank A. Heller, directors. Organized, 1907, under laws of Idaho, capitalization \$1,500,000, shares \$1 par, assessable.

Lands, 4 claims, 80 acres, 40 acres of placer ground, a 5-acre mill site and 20 acres of timber land, 1½ miles west of Pritchard creek and about 7 miles west of Murray. Property shows porphyry and slate, with 2 veins of 4 to 6' estimated average width, carrying lead and copper sulphides with some silver, estimated by management to average 10% copper, 25% lead, 25 oz. silver and \$4 gold per ton. Development includes a 45' shaft and 4 tunnels with 675' of workings. Mine has water power and 3 small buildings. Management planned driving a new 800' tunnel in 1911, but no recent returns secured.

NEW COLUMBIA MINING CO.

IDAHO

Mine office: Salmon, Lehmi Co., Idaho. H. Armstead, superintendent. Ores carry copper and gold. Has steam power and a 10-stamp mill. Idle several years and presumably waiting for a "boom" to raise money for new development work.

NEW CORNELIA COPPER CO.

ARIZONA

Office: 611 Wright Bldg., St. Louis, Mo. Operating office: Gila Bend, Maricopa Co., Ariz. Mine office: Ajo, Pima Co., Ariz. Geo. H. Augustine, pres.; C. E. Neeley, vice-pres.; John R. Boddie, sec.; C. A. Bowman, treas.; preceding officers, C. W. Chamberlain, T. C. Ratcliffe, H. B. Salls, Stuart E. Pierson, Ralph C. Lupton, and H. W. Mann, directors. Organized Sept. 28, 1909, under laws of Delaware, as a reconstruction of the Cornelia Copper Co., capitalization \$6,000,000, shares \$5 par, nonassessable; issued, \$2,650,000. Debentures, \$50,000, at 8%, called in and paid July, 1912, two years before maturity. Bankers Trust Co., St. Louis, registrar and transfer agent. Annual meeting, second Tuesday in December.

The Calumet & Arizona Mining Co. was given a year's option on all of the treasury stock and about 65% of issued stock at \$2.50 per share in Sept., 1911, which option was taken up in Oct., 1913. This company has had possession of the property since Oct., 1911, and has spent from \$5,000 to \$20,000 per month since that date.

Drilling and other work on the property by the Calumet & Arizona Co. has, it is said, proven the existence of 29,000,000 tons of ore carrying 2% copper, mostly available for steam-shovel mining. Much of this ore carries too much oxidized material to be concentrated, but will be treated by leaching.

Property, 14 claims, all patented, area 243 acres, 45 miles from the Southern Pacific railroad at Gila Bend, Ariz. Claims show monzonite, porphyry and granite, carrying disseminated copper ore. Mine has about 1,100' of workings.

Ores include cuprite, malachite, chalcocite, bornite and chalcopyrite. From the surface down to a depth of about 150' it is principally carbonate ore; below the oxidized zone the rock carries sulphides, which continue downward to the greatest depth explored, but are of low grade.

The average value of both the carbonates and sulphide ore is something less than 2% for the entire property and, so far as exploration has extended, no barren ground has been encountered. The ores carry about 2 oz. of silver and \$1 in gold per ton beside copper values.

Equipment includes a 40-h. p. and 60-h. p. steam plant, with hoists and a 1-drill compressor. There are 5 buildings, including a machine shop and smithy. A 10-stamp mill has 10 gravity stamps, a 75-ton Gates crusher, 4 Wilfley tables and 3 sizers.

The company's early history and its experiments with new processes are fully described in Vols. VI, VIII and X. In 1910, the General Development Co. bought 20,000 shares of stock for \$20,000, spending the money under an option for a stock control, putting down 5 diamond-drill holes, deepest 188', which showed the ground to be oxidized to a depth of about 30', followed by sulphides, estimated by the company to average 2 to 2.75% copper. The option was forfeited 1910 and property was leased to H. C. Chamberlain who shipped concentrates from 800 tons of 4% ore to the Copper Queen smelter.

NEW DOMINION COPPER CO., LTD.

BRITISH COLUMBIA

Office: 42 Broadway, New York, N. Y. General office: Greenwood, B. C. Works office: Boundary Falls, Boundary district, B. C. Lucius W. Mayer pres.; Newman Erb and C. A. Starbuck, vice-presidents; preceding officers, C. B. Mears, Hon. Warren W. Foster, John A. Sleicher and Chas. H. Burke, directors; H. B. Blanchard, sec.; R. H. Eggeleston, treas.; Oscar Lachmund, gen. mgr.

Organized June 9, 1909, under laws of British Columbia, capitalization \$1,750,000, shares \$5 par; issued, \$1,178,320; treasury holds \$499,800 in stock for conversion of like amount of bonds. Debentures, \$500,000 ten-year 6% gold income bonds, convertible into stock at par; outstanding March 31, 1912, \$483,650. Empire Trust Co., New York, transfer agent. Annual meeting, first Monday in June.

The annual report for the year ending March 31, 1913, shows a net profit of \$116,949. Cash in bank amounted to \$164,516, accounts receivable \$128,288 and accounts payable \$14,492. The figures for 1912 were as follows: Operating loss, \$11,811; cash in bank, \$114,578; accounts receivable, \$91,125; accounts payable, \$15,778. Company made payment of coupon No. 4 of its bonds in Oct., 1913, holders releasing company from payment of coupons Nos. 1, 2 and 3, as income was not earned.

This company is a drastic reconstruction of the Dominion Copper Co., Ltd., originally the Montreal & Boston Mining Co. The property was acquired at foreclosure sale for \$347,999.85. Is controlled, through ownership of about 155,000 shares, or 64% of the issued stock and one-third of the bond issue by the British Columbia Copper Co., Ltd.

The mines are operated by the British Columbia Copper Co. and the ore is smelted by that company under a contract providing for the payment of actual smelting charges plus 50 cts. a ton for interest and depreciation. A recent change has been made which provides for a fixed profit of 15 cts. a ton guaranteed by the British Columbia Copper Co., regardless as to whether such amount be realized from the ore or not.

Lands, 15 claims, 500 acres, fractional interests in 94 claims additional, also a 32-acre mill site, an 80-acre town site, a water-power plant at Boundary falls and a 1,000-ton smelter. Mining lands are in 4 groups, in the Phoenix, Deadwood, Wellington and Summit camps. Country rocks are limestone and greenstone, orebodies occurring largely as replacements in greenstone. These deposits are all more or less developed, of about 25' average width, a generally north-south strike and average dip of about 40°. The ores are low in average grade and the mines, though showing large orebodies, have a comparatively small amount of ground blocked out. For the fiscal year ending July 31, 1907, the mines made 8,519' of new openings. From June 17, 1909 to March 31, 1910, the mines were not operated. The Rawhide and Athelstan mines were reopened in 1910.

The mines at Phoenix, comprising 366 acres, include the Brooklyn, Idaho, Rawhide, Stemwinder, Montezuma and Standard mines. The Brook-

lyn and Idaho are adjoining properties and the Rawhide is about one-half mile distant.

The Brooklyn mine, which was for years the principal producer of the company, has a 430' main shaft, with a steam hoist and about 8,000' of workings, showing a 40' vein, estimated to average 1.43% copper, 25 cts. silver and \$1.32 gold per ton. The orebody was relatively high grade, but is faulted or cut off by a cross fracture and not recovered beyond it.

The Idaho mine, connected with the Brooklyn on the 250' level, is developed by tunnel and shaft, latter having an electric hoist, but the mine is worked open cast.

The Stemwinder mine, opened on a vein parallel with and about 1,000' east of the Brooklyn, has a 400' shaft, with about one-half mile of workings, yielding ore averaging about 1.4% copper, 25 cts. silver and \$1 gold per ton.

The Rawhide mine, now the principal producer, shipping about 600 tons of ore daily, adjoins the Gold Drop mine of the Granby. The property, thoroughly prospected by diamond drilling, has ore averaging about 1.4% copper, 25 cts. silver and 90 cts. gold per ton. Development is by a 180' shaft, 6 tunnels and various open cuts; work aggregating 1,229' of drift and crosscut work with 1,208' of raise and winze work, besides enlargement of former openings, was done in 1910-11 and 950' of diamond-drill exploration in 1912. Ore is sent through chutes to the main level and trammed through the tunnel and over a trestle to ore bins at the crusher plant. Production 1912, 172,856 tons.

The Montezuma and Standard claims, but slightly developed, show low-grade ores similar to those of the other mines of the Phoenix camp.

The Deadwood group, 110 acres, includes the Sunset, Morrison, Crown Silver, Little Buffalo and C. O. D. mines.

The Sunset mine, now idle, has shafts of 200' and 412', and large open-cast workings. The orebody is valuable chiefly for flux as it carries excess of iron, silica and lime, with only small copper, silver and gold values. A trestle from the Sunset mine runs to a 2,000-ton ore bin on the railroad siding. Equipment includes a 14x20" Jenckes duplex link-motion hoist, 14x20" Lidgerwood double-cylinder hoist, and a 10-drill Ingersoll-Sergeant duplex air compressor. Production of the Sunset mine, 1907, was 31,258 tons of ore.

The Crown Silver mine adjoins and is practically a part of the Sunset. Development is by a 265' shaft and an 880' tunnel.

The Morrison mine has a 364' shaft with 4,300' of tunnels, showing ore averaging about 0.6% copper, 1.5 oz. silver and up to \$4 gold per ton. Equipment includes a 110-h. p. steam plant with a 7x9" hoist and 5-drill Canadian-Rand air compressor.

The Athelstan or Wellington group includes the Athelstan and Jackpot mines, with combined area of 34 acres. These show a large outcrop of oxidized ore carrying very low values in copper, about 1 oz. silver and up to \$7.50 gold per ton, but expected to carry somewhat better copper values below the oxidized zone. The Jackpot was a considerable producer 1910 and the new company ran a 200' tunnel and did 1,000' of diamond drilling in 1910-11. The Athelstan mine produced 6,388 tons in the year ending March 31, 1912, but mine was shut down Dec., 1911, as vein is narrow and prospects for more ore are unpromising.

The Summit group includes a one-half interest in the Lancashire mine, having a vein carrying silver ore, and a three-fourths interest in the Mountain Rose mine. The Mountain Rose, developed by 2 tunnels, has a vein

about 15' wide, carrying pyritic ore, low in silica, with small gold and silver values for fluxing purposes.

Equipment at the Brooklyn mine at Phoenix includes electric hoist and a 25-drill Canadian-Rand air compressor, driven by a 450-h. p. Canadian Westinghouse electric motor.

Electric power is taken from the Bonnington Falls plant of the West Kootenay Power & Light Co., transmitted 87 miles at 60,000 volts, entering the works at 2,000 volts and then being stepped down again to 550 volts for use.

Ore is transported 4 to 25 miles by rail from the various mines to the smelter, at a freight rate of 17 cts. for Deadwood ore and 30 cts. per ton on ore from the mines of the Phoenix and Summit camps.

The 1,500-ton smelter, 4 miles from Greenwood, is now idle. Described Vol. X.

Production of the old company, for year ending July 31, 1907, was 187,981 tons of ore, yielding 2,910,695 lbs. fine copper, 42,606 oz. silver and 10,321 oz. gold, giving an average recovery of about 15.5 lbs. fine copper, 0.5 oz. silver and \$1.10 gold per ton.

Production for the year ending March 31, 1913, was 294,300 tons of ore yielding 7,304,713 lbs. copper, 10,862 oz. gold and 79,450 oz. silver. The treatment cost was \$1.85 per ton and the company received 16.655 cts. per pound for its copper and 61.743 cts. an ounce for its silver.

NEW DOMINION GOLD MINING CO.

COLORADO

Letter unclaimed at Denver, Colo. Mine near Ophir, San Miguel Co., Colo. Samuel Morris, pres.; J. V. Butler, vice-pres.; J. H. Frank Smokey, sec.-treas. and gen. mgr., at last accounts. Organized 1906, under laws of Arizona, capitalization \$1,800,000, shares \$1 par. Has tunnels of 940' and 1,100', showing auriferous and argentiferous copper, zinc and lead sulphides. Probably dead, as it had no funds on hand in 1910.

NEW DOMINION MINES CO.

ARIZONA

Office and mine; Globe, Gila Co., Ariz. Organized 1905, capitalization \$1,000,000. Lands, about a half mile north of the Gibson mine, are said to show a 12" vein in schist, opened by 240' shaft. After 2 years of work, this vein, carrying chalcopryrite ore averaging 23% copper, was struck in a cross-cut from the tunnel face.

NEW ELY CENTRAL COPPER CO.

NEVADA

Main office: 907 Market St., Wilmington, Del. Business office: 16 State St., Boston, Mass. Mine office: Ruth, White Pine Co., Nev. James Milne, pres.; John G. Gray, vice-pres.; Jonathan H. Brown, sec.; H. E. Lodge, treas.; J. Pearce Cann, local mgr. directors; Frank J. Gallagher, supt. Organized Feb. 19, 1912, under laws of Delaware, capitalization \$8,000,000, shares \$5 par, fully paid, nonassessable; issued, 500,000 shares. Bonds authorized, \$500,000, 6%; \$175,000 issued. American Trust Co., registrar; Federal Trust Co., transfer agent. Annual meeting, second Monday in February. This corporation was reorganized from the wreck of the Ely Central Copper Co. by about 1,600 of its stockholders. All the stock and bonds that have been issued are to the stockholders of the corporation which participated in the reorganization plan, except stock of the par value of \$5,550,000 which was issued in trust for treasury purposes. The management proposes a careful but comprehensive plan of exploration for the purpose of developing a mining enterprise. Balance sheet for year ending Dec. 31, 1912, showed gross earnings \$18,607 and net earnings of \$11,893.

The development of the property is to be done by the Mines Development Co. under an agreement by which a deed to the property is placed in escrow to be delivered to the Mines Development Co. on or before

Jan. 1, 1915. The latter company was to immediately commence drilling the ground, agreeing to sink at least one 2,000' hole and such other holes as will convince them of the value of the property. If the deed is taken up the new Ely Central stockholders will be paid \$1 per share for their stock. An alternative offer is that the stock or bonds may be turned in for exchange for stock of the new company of similar capitalization at the underwriting price.

Property, 32 claims, patented, except 1 fraction, 479.66 acres, in the Robinson district, White Pine Co., Nev. Claims join the property of the Nevada Consolidated Copper Co., lying immediately east and north of the Copper Flat and the Liberty steam-shovel pits of that company. They cover an area of altered limestone and rhyolite with small exposures of monzonite. This rhyolite is a flow underlain by volcanic tuffs resting on mineralized monzonite, in a small tract immediately east of the Copper Flat steam-shovel pit where faulting along a nearly north and south line has thrown rhyolite against limestone and monzonite. The greater part of the rhyolite area is however underlain by altered limestone. The value of the property rests upon the determination of the presence of disseminated copper ore beneath the rhyolite and of the finding of commercial orebodies in the limestone.

Development up to the present time has been small. A limited amount of churn drilling done in former years failed to disclose commercial ore and in fact most of the holes are believed to have been in altered limestone, or in barren rhyolite. A drill hole in the southeast section of the property is said to show disseminated porphyry ore beneath the rhyolite flow, but sufficient drilling has not yet been done to prove its extent, or commercial worth. Workings from the Zack shaft on Ely Consolidated ground, driven to within a few feet of the east boundary of the Ely Central claims, show oxidized copper ore dipping into the New Ely Central from the east on the 600' level.

A comparatively shallow drill hole on the north contact gave encouraging indications late in 1912. The former company sank the Eureka shaft 627' deep with 375' of drifting on the 455' level and 151' on the 600' level, and the workings are said by former engineers to prove theory of faulting to be correct, but the workings were too deep for commercial ore. The Clipper shaft, 235' deep, has 295' of drifting and 92' of crosscutting on the 220' level. This shaft is in the jasperoid area and the limited workings demonstrated the presence of low-grade copper ore carrying small gold and silver values. These workings are now flooded. Two shallow shafts near the center of the ground and north of the Copper Flat pit show malachite ore of commercial grade in a fissure in limestone. Other workings near the north contact, on 1 of the westerly claims, show small bunches of high-grade ore.

Despite all that has been said and done, this property is still a prospect and its value remains to be determined. The Nevada Consolidated has made a contract with the company to prospect the Stewart claim by a 600' drill hole with a view of purchasing the surface rights for dumping waste, or carbonate ore from the steam shovel pits, in case the drill hole fails to develop steam-shovel ore 200' from the surface.

On Oct. 23, 1913, the Consolidated Coppermines Co. offered to take the New Ely Central bonds at par, payable 25% in convertible 7% bonds and 75% in stock of the Consolidated Coppermines Co. at par and to exchange stock at rate of 20 shares New Ely Central for 1 of Consolidated Coppermines. The offer is to be binding if accepted by a majority of the stock and bondholders without delay.

NEW ENGLAND & ARIZONA GOLD & COPPER MG. CO. ARIZONA

Idle. Letters to 250 Devonshire St., Boston, Mass., and Humboldt, Yavapai Co., Ariz., unanswered. Geo. A. Wooden, pres.; Louis Harlow, treas.; John H. Farrell, supt., at last accounts. Organized Jan. 19, 1901, under laws of Arizona, capitalization \$750,000, shares \$1 par.

Lands, 6 claims, 3 patented, 120 acres, including the Red Star group and Calumet groups, near McCabe, Ariz. The property is said to show 2 parallel veins, 30' apart, having paystreaks of 2' width, carrying ore assaying about 10% copper, with gold and silver values. The mine has a 600' two-compartment main shaft, a power house with a 70-h. p. boiler, 35-h. p. hoist and a small air compressor. Mine shut down many years.

NEW ENGLAND & CLIFTON COPPER CO. ARIZONA

Property near Clifton, Greenlee Co., Ariz., sold to the Detroit Copper Co. in 1912. By this purchase the Detroit Copper Co. acquired all the New England properties and also control of the Standard Consolidated Copper Co., which owns a majority of the stock of the Standard Copper Mines, the Clifton Copper Mines, Ltd., and a 26% interest in the Coronado Mining Co. The New England & Clifton is largely owned abroad and about \$2,000,000 was expended upon the property, but accumulated debts bankrupted the company and property was acquired at sheriff's sale by John K. Erskine. He in turn transferred it to the Phelps-Dodge interests. Fully described Vol. X.

NEW ENGLAND GOLD & COPPER MINING CO. UTAH

Office: 67 Milk St., Boston, Mass. Mine office: Bingham Canyon, Salt Lake Co., Utah. Jas. S. Williams, pres.; E. E. Abercrombie, vice-pres. and managing director; Geo. F. Bradstreet, sec.-treas.; preceding officers, Woodford Yerxa, Thos. Kellough, Francis H. Dowse and Geo. Bancroft, directors; David J. Cook, gen. mgr. Organized June, 1899, under laws of Colorado, capitalization \$2,000,000, shares \$10 par; issued, \$1,294,467. Bonds, \$500,000 authorized, at 6%; issued, \$119,800. Paid a 10% stock dividend, Oct., 1908. Federal Trust Co., Boston, registrar; Geo. F. Bradstreet & Co., transfer agents. Annual meeting, first Monday in June. Company owns the Bingham group of 9 fractional claims, 18 acres, in the Bingham, or West Mountain district, Utah, lying south of the Boston Consolidated, next to the Last Chance group and near the Utah Metals property.

The old Nast mine of the Bingham group shows porphyritic country rock carrying 3 fissure veins, of 30" average width, opened by the 1,600' Nast tunnel and the 1,670' Benton tunnel, both in ore, and 2 shafts, 1 of 159', with a total of about 6,000' of workings. Veins are said to widen at depth and ores are said to give average assays of 30% lead, 10% zinc, 15 oz. silver and \$4.50 gold per ton, with small and variable percentages of copper, some of the monzonite country rock carrying copper values that may prove workable at some later date. The mine produced milling silver-lead ore, handled in a 50-ton concentrator, running 1 shift, yielding 150 tons high-grade concentrates per month in 1911.

Equipment includes a steam plant with 2 hoists, 1 of 30 h. p., good for 800' depth.

The concentrator has a 4x12" Sturtevant crusher, 2 rolls, 2 Hartz jigs and 1 Wilfley table, operated by commercial electric current. Production was 2,108 tons of lead concentrates and 165 tons of copper ore, 1907, but property was closed down, late 1907, and mine was worked on only a small-scale, 1910, securing 936 tons of ore, giving net smelter returns of \$29,013, an average of \$30.98 per ton. In Feb., 1910, the Utah Metal Mining Co. sued this corporation for \$700,000 damages, alleging trespass and illegal

ore-extraction. The company also owns a group of 4 claims at Goldfield, Nev.

NEW ENGLAND MINING CO.

MASSACHUSETTS

Idle. Office: 35 School St., Greenfield, Mass. Mine office: Charlemont, Franklin Co., Mass. Othello A. Fay, pres.; E. Forrest Sweet, sec.; Capt. Geo. H. Davenport, treas. and gen. mgr., at last accounts. Organized 1902, capitalization \$500,000, shares \$5 par.

Owens about 1,000 acres 2 miles west of the Davis pyrite mine. Vein, traceable 700', is approximately vertical, conforming closely in dip and strike with the Savoy schist in which it occurs. Deposit apparently is a fahlband, lacking well-defined walls, ore occurring scattered through 15 to 20' of the schist, with 6 to 12" of quartz, well mineralized, on the south wall, and a heavy impregnation of chalcopryrite, $\frac{1}{2}$ to 2' wide, on the north wall. Property has been partly stripped, and vein trenched across.

NEW GOLD KING MINES.

COLORADO

Office: Care L. E. G. Green, secretary, 53 State St., Boston, Mass. Mine office: Silverton, San Juan Co., Colo. Property, the Gold King and Sampson mines, developed by a 625' shaft and a 2,800' tunnel, showing copper ores with values mainly in gold. Equipment includes steam and electric power. The 350-ton concentrator has 80 stamps and 4 tube mills.

The property has been conveyed to a committee of 3 to hold in trust for stockholders, bondholders and creditors, and leased by committee to Otto Mears, Denver, Colo., on shares, with option to purchase.

NEW HAVEN COPPER CO.

CONNECTICUT

Property at Seymour, Conn., is developing a copper-bearing band of hornblende schist, carrying chalcopryrite with some bornite. Operations have been carried on intermittently for several years, the last work being done in Oct., 1911. Company has power plant on the border of the Naugatuck river, flooded in 1911.

NEW ISSUE GOLD MINING & MILLING CO.

ARIZONA

Probably dead. Formerly at Mayer, Yavapai Co., Ariz.

NEW JERSEY METAL REFINING WORKS, LTD.

NEW JERSEY

Works office: Elizabeth, Union Co., N. J. Is controlled by Mountain Copper Co., Ltd.

NEW KEYSTONE COPPER CO.

ARIZONA

Office: 42 Broadway, New York, N. Y. Mine office: Miami, Gila Co., Ariz. Employs 50 men. Samuel A. Lewisohn, pres.; J. Parke Channing, vice-pres. and cons. engr.; preceding officers, Adolph Lewisohn, Walter T. Rosen, Jacob Langeloth, Theo. L. Herrmann, Ralph C. Lupton, J. S. Dunston and J. H. Susmann, directors; E. H. Westlake, sec.-treas.; B. Britton Gottsberger, gen. mgr.

Organized July 16, 1909, under laws of Delaware, capitalization \$3,000,000, shares \$5 par, nonassessable; issued, \$1,790,870. Was a reconstruction of the Keystone Copper Co., shareholders of the old company taking stock in the new in exchange for the property. Is controlled through stock ownership by the General Development Co. On June 18, 1912, company had \$111,790 cash on hand with development expenditures to date of \$215,414, general and administrative expenses of \$24,358, and insignificant current bills. Expenditures at the mine for the calendar year 1912 were \$25,229. Farmers Loan & Trust Co., New York, registrar. Annual meeting, third Wednesday in June.

Property consists of 16 patented claims, 243 acres, forming a tract separating the Live Oak and Inspiration mines of the Inspiration Consolidated Copper Co. About 60 acres of this land is underlain by Pinal schist, covered in part by a sheet of granite porphyry, 25 to 200' thick.

A strong fissure vein crosses the property and was mined by the old Keystone Copper Co., the vein being 12' thick with a paystreak averaging 15" from which shipments of 19 to 22% copper and 2 to 5 oz. silver per ton were made for some years, the mine yielding according to report about \$1,000,000. The present company has explored and opened up a deposit of disseminated glance ore similar to that of the Miami mine and the value of the property rests primarily on the amount of this ore.

Development by the new company has consisted in blocking out this orebody by underground workings and by churn drilling. The Keystone shaft is 330' deep and has 4,436' of work on the 150' level, 7,081' on the 250' level and 2,163' of raises and 156' of winzes, a total of 14,886'. Churn drilling along 200' squares was discontinued June, 1912, after company had put down a number of holes with an aggregate of 21,947' of work. These holes and the underground development together blocked out 2,516,000 tons of ore, which recent sampling shows to have an average value of 2.25% copper.

A lawsuit between the Inspiration Consolidated and this company was decided in its favor and prevents the Inspiration from carrying its main haulage tunnel through the Keystone ground.

The surface indications on the property are excellent but development has been disappointing in the amount of ore disclosed. Consolidation with another property seems necessary, though management is good and is aided by the best of expert advice.

The large amount of oxidized ore in the property makes treatment by the usual methods uncertain, only about 30% of the oxidized material being saved. Experiments by flotation and leaching methods are expected to materially increase the percentage of extraction and Mr. R. C. Canby, now engaged in experimental work in a testing mill on this ore, is understood to have evolved a cheap and very satisfactory method of treatment for the mixed oxidized and sulphide ore of the Keystone and Miami mines.

NEW MEXICO LEAD & COPPER CO.

ARIZONA

Address: E. E. Breed, Walker, Yavapai Co., Ariz. E. S. Osburn, superintendent. Property, the Breed group of mines near the Senator mine and about 2 miles from Walker P. O., taken over in 1912. The Effie claim shows a fissure vein reported to have 4' of chalcopryite and galena at 40' in depth. Machinery and electric drills were to be installed and 2 shafts sunk on the vein in summer of 1913, company receiving electric power from Walker.

NEW MONARCH MINING CO.

COLORADO

Office: Care J. Langeloth, 52 Broadway, New York City. Mine office: Leadville, Lake Co., Colo. Jas. B. McDonald, pres.; Frank Fuller, supt., at last accounts. Company is controlled by the American Metal Co., Ltd., a close corporation, through the Ohio & Colorado Smelting & Refining Co., owning the Salida, Colo., smelter. Owns the New Monarch and Cleveland mines, carrying copper, lead and zinc sulphides. Equipment includes a steam plant, air compressor, etc.

NEW PLANET COPPER MINING CO.

ARIZONA

Office: 42 Broadway, New York. Mine office: Planet, Yuma Co., Ariz. Chas. S. Barton, pres.; Wm. G. Nickerson, vice-pres.; Alexander Rae, sec.; Julius H. Susmann, treas.; preceding officers, S. S. Rosenstamm, Geo. Crompton, Jas. M. Satterfield and O. J. Ashman, directors; Samuel Untermyer, gen. counsel; J. Parke Channing, cons. engr. Organized July 13, 1909, under laws of Delaware, capitalization \$4,000,000, shares \$5 par, non-assessable; issued, \$1,714,525. Is a reconstruction of the Planet Copper Mining Co., stock of which was retired by exchange for 240,000 shares of New Planet stock. The General Development Co. owns 100,000 shares and had an option on 460,000 shares additional, but forfeited same after the

company expended about \$150,000 on exploratory and development work. Farmers Loan & Trust Co., New York, registrar. Annual meeting, third Wednesday in June.

A financial report for the calendar year 1911, issued in Oct., 1912, showed \$4,804 spent in 1911, about \$1,300 being used for mining development and \$3,000 for salaries. Cash on hand amounted to \$1,000, a poor showing for a company whose property is credited as costing \$4,041,715.

Property, the Planet mine with 31 patented claims and 3 unpatented placer claims, 750 acres, in the Harcuar district, on the southern bank of the Bill Williams Fork river, $21\frac{1}{2}$ miles from Bouse on the Santa Fe cut-off and about 6 miles from Swansea. The copper occurs mainly as oxidized ore, though nucleal particles of sulphides mixed with specular hematite are seen in the deeper workings. The orebodies are replacements in limestone, the ore bed developed at the Plant shaft lying on the contact between this rock and underlying gneiss. This deposit is 3 to 20' thick and dips 15° south. Much high-grade ore has been shipped from other parts of the property in past years; it was found as crusts, or shells, about impure hematite in limestone, especially near bodies of amphibolic rock now altered to black gneiss. A deep-seated mass of granite is the not improbable source of mineralization, although later igneous activity is shown in a volcanic plug not far distant and in the basalt flows which cover the surrounding country. The geology is very fully discussed in U. S. G. S. Bul. 451, p. 47, written by Howland Bancroft.

The ore deposits show a heavy iron gossan, mainly of hematite, apparently of workable grade, and it has been estimated that the property shows about 500,000 tons of 60% iron ore. The main orebody developed in the Planet shaft is about 300' in width, has a thickness of 4' 3" and an average copper content of 5.9%, according to a report by A. H. Kellar.

The main development, aside from open cut and tunnels, is at the Planet shaft, an incline sunk on the ore bed at an average angle of 15° to a depth of 733'. There are drifts, crosscuts, etc., amounting to 2,500'. A vertical 350' shaft connects with these workings and gives ventilation.

The old workings include 8 tunnels, longest 225' and 12 vertical pits and shafts, of 25 to 325' depth. About \$150,000 was expended under the management of the General Development Co. in sinking the vertical shaft and putting down a number of churn-drill holes, 3 holes showing low-grade sulphide ore below the old workings.

The Planet mine is probably the oldest copper mine in Arizona. It was opened in 1864, worked in a small way until 1874, and reopened in 1884 when a 36" circular blast furnace was erected. The property was taken over 1902, by the predecessor of the present company. The mine produced, 1864-74, upwards of \$500,000 worth of high-grade ore, ranging from 15 to 40% in copper, which was shipped down the Colorado river to a port on the Gulf of California, presumably Guaymas, and thence to Swansea, for reduction. A little ore was also shipped to San Francisco, and is said to have given fair profits, notwithstanding the heavy cost of freight and smelting and harassments by Indians.

Equipment includes a 75-h. p. gasoline plant, with two 15x25" hoists and a 5-drill air compressor. Buildings include a 15x40' frame carpenter shop, 10x10' smithy, 2 shaft houses and 3 dwellings. Property considered as still unproven, as churn drilling was too limited to determine existence, or nonexistence of large ore bodies, and the greater part of the area is unexplored.

NEW STATE COPPER MINING CO.

ARIZONA

Idle. Office and mine: Tucson, Pima Co., Ariz. James W. Bogan,

pres.; Chas. Bent, vice-pres.; Lyman W. Wakefield, treas.; Ralph K. Shelton, sec., at last accounts. Capitalization, \$2,000,000, shares \$1 par. Lands, 9 claims, in the Tucson mountains, 14 miles west of Tucson, show a prominent gossan, carrying oxidized ores and a little chalcocite, with small gold and silver values. Has a 40' shaft, showing a little chalcopyrite, and a short tunnel, with 400' of workings. Has shipped about 300 tons of ore.

NEW STATE COPPER MINING & SMELTING CO. ARIZONA

Address: Care Harry Sultan, Globe, Ariz. Organized 1911, under laws of Arizona. J. N. McDonough, pres.; Harry Sultan, vice-pres.; Wade Sotel, sec.-treas.; John F. Shaw, Frank Hubel and Chas. Miller, directors. Thos. P. Kelly, mgr. Annual meeting first Saturday in September. Property, 33 claims adjoining the Continental mine, at head of Webster gulch, about 10 miles from Miami. Claims cover an area of faulted quartzite, limestone and diabase, with quartz porphyry to the west of a strong fault. The Republic claim is crossed by the Duquesne vein in limestone, which is 5' thick and shows 1 to 3' of shipping ore carrying high values in copper and lead with vanadium. A 50' shaft sunk on this vein proved to be on patented ground belonging to the Continental mine of the Old Dominion Smelting Co. The vein has, however, been cut at a depth of 500' by a new 1,000' crosscut tunnel. Property regarded as promising and management honest and competent.

NEW STATE MINING & REDUCTION CO. ARIZONA

Office: 316 New England Bldg., Topeka, Kan. Mine near Amadoville, Santa Cruz Co., Ariz. Thos. M. Park, superintendent.

Property, 26 claims, showing veins carrying lead-zinc-copper ores, with gold and silver values.

Development is by 150' shaft with 950' tunnel developing ore. Equipment includes gasoline hoist and Ingersoll air compressor. In 1913 was planning to erect a 100-ton dry concentrator to treat low-grade ores.

NEW STATE SMELTING CO. NEW MEXICO

W. H. Case, mgr.; Herman L. Schneider, supt., Socorro, Socorro Co., N. M. Has a 200-ton copper-smelting plant, employing 50 men when operating and is equipped with steam power.

NEW UTAH BINGHAM MINING CO. UTAH

Office: 168 Bridge St., Springfield, Mass. Mine office: Bingham Canyon, Utah. W. W. Bellows, pres. and gen. mgr.; J. M. Donahue, sec.; G. H. Wing, treas.; preceding officers, J. E. Stanton and H. K. Bellows, directors; P. M. McCree, supt.

Organized April, 1912, under laws of Maine, capitalization \$1,375,000; shares \$2.50 par, \$2.30 paid; 397,532 shares outstanding. Authorized bonds, \$100,000, 5 year, 7%, issued Sept. 23, 1911, and payable Sept. 23, 1916; \$17,000 outstanding, \$23,000 cancelled. Security Transfer & Registrar Co., New York, and W. W. Eaton & Co., Springfield, Mass., transfer agents. Stock is listed on New York curb. Annual meeting, June 18. Company acquired property and assets of the Utah Bingham Mining Co. for \$1,182,550, giving the shareholders 1 new share, \$2.15 paid, for each \$5.00 share held.

Property, consists of 19 patented and 1 unpatented-claims, adjoining the Telegraph mine of the United States Mining Co., in Bingham Canyon, Utah. Claims cover about 3,000' along the footwall portion of the Jordan limestone ore-bearing zone of Bingham. The large orebodies of this district are found in fissures within the limestone, or along limestone contacts, and the Jordan belt is the most productive of the 3 belts known in the camp.

Development, before the company acquired the property, exposed a number of promising veins carrying ore in the porphyry, but too narrow to

be valuable. These veins pass into the limestone and are expected to have large orebodies at the contact.

In the Turngren tunnel, now over 1,200' long, 8 veins from 1 to 4' thick have been cut, 7 showing ore and 2 of them worked. These 2 veins run north and south, are parallel and contain high-grade ore in the Spanish mine and along the outcrop in the company's ground. The Harrison tunnel, 600' long, is in quartzite and will crosscut the Rough and Ready veins, which are opened by 3 other tunnels higher up the mountain, all showing ore. The Giant Chief vein is a fault fissure containing an orebody now worked out. It has a 200' shaft from which further exploration of the fissure will be done. Mine is equipped with compressor, 180-h. p. electric plant, taking current from the Utah Power & Light Co., hoist and all necessary buildings. Property is well adapted for tunnel work, has large blocks of virgin ground and is considered promising.

NEW YERINGTON COPPER CO.

NEVADA

Office: 1511 Walker Bank Bldg., Salt Lake City, Utah. Mine address: Yerington, Lyon Co., Nev. Chas. N. Strevell, pres.; Joseph E. Caine, vice-pres.; W. B. Outcalt, sec.; J. H. Paterson, treas.; S. V. Derragh, H. P. Clark, H. C. Edwards and Duncan MacVichie, directors; V. A. Gilles, supt. Organized Aug., 1911, under laws of Utah, capitalization \$1,000,000, shares \$1 par, assessable, at rate not to exceed 1 ct. for each 90 days. Listed on Salt Lake Stock Exchange. Is a reorganization of the Yerington Copper Co., whose stockholders received 1 share of new for 2 shares of old stock, leaving 570,000 shares in treasury.

Property, 12 claims, 4 miles due east of Yerington, shows porphyritic granite cut by diorite dikes. There are 3 distinct, nearly parallel veins, 50 to 300' apart, following the dike contacts. The oxidized ores extend downward about 100' and are underlain by enriched glance changing in depth to shoots of chalcopyrite and pyrite.

Chief development is on the middle, or Yerington vein by a 450' incline shaft having levels at 250' and 400' below the surface. The 250' level exposes an ore shoot 1 to 3' thick from which shipments have been made intermittently for past year. The 400' east drift, 424' long in June, shows a soft vein carrying a narrow shoot 3 to 5' thick of chalcopyrite ore in an altered gangue. The west drift is 210' long and shows another shoot of 8% ore. The Marsal 520' tunnel on the same vein encounters another ore shoot at 340', that is 1½ to 3' wide and has 3% ore extending to top of 90' raise. Shipments thus far have not quite covered expenses.

Equipment includes a 40-h. p. gasoline hoist, 320-cu. ft. compressor run by a 60-h. p. gasoline engine and a pumping plant jointly owned with the Blue Jay Co. Property regarded as promising.

NEW YORK-ARIZONA GOLD & COPPER CO.

ARIZONA

Office and mine: Morenci, Graham Co., Ariz. A. L. York, pres.; J. F. Cleaveland, vice-pres.; C. E. Tyler, sec.-treas.; preceding officers, R. E. Moore, W. C. Crawford and D. M. Causler, directors; John C. Molder, gen. mgr.; J. R. Wester, supt., at last accounts. Organized April 15, 1907, under laws of Arizona, capitalization \$900,000, shares \$1 par.

Lands, 30 claims, unpatented, 600 acres, and a 150-acre mill site, 4 miles west of Morenci, in the Copper Mountain district. Property includes the Buzzard Shadow and adjacent groups, showing quartzite, shale and limestone cut by porphyry. The claims show contact deposits having a generally east-west strike, with vertical dip. Four orebodies, more or less developed, ranging from 10" to 4' in width, with a claimed extreme width of 50', carry copper sulphides, said to assay about 15% copper, 10 oz. silver and \$10 gold per ton, which must be from selected ores.

There are 3 tunnels, formerly reported as of 100', 450' and 600' length, and the Lillian tunnel, 1,800', claimed to show a 6" to 6' vein carrying several ore shoots. There are 5 shafts, including the 260' Argentine shaft, showing copper sulphides, the 80' Louise shaft cutting an 8" vein showing ore assaying up to 15% copper, 180 oz. silver and \$20 gold per ton, and the 72' Jensen shaft near the Louise. The Buzzard Shadow group, at the eastern end of the property, shows a 2 to 4' vein carrying auriferous and argentiferous copper ore. Values, as developed in the mine as a whole, are mainly in gold. The mine is wet.

Equipment includes a 15-h. p. Fairbanks-Morse gasoline hoist at the Louise shaft, 4 Nissen stamps and a tube mill. Property leased until June, 1913, and reported to have shipped ore averaging \$1.35 per ton. Company expects to resume work with money received from royalties on expiration of present lease.

NEW YORK BONANZA MINING CO.

UTAH

Letters neither answered or returned from Salt Lake City, Utah. Mine office: Park City, Summit Co., Utah. Accounts for year ending Sept., 1912, showed \$3,334 liabilities over assets, despite assessments of 13 cts. per share to that date. M. J. McGill, manager. Property, 7 patented claims in Ontario canyon, 3 miles from Park City, showing lead and copper sulphides all silicious; has shipped considerable ore from the 400' and 500' levels, averaging about 2% copper, 10% lead, 100 oz. silver and \$2.50 gold per ton.

NEW YORK CONSOLIDATED MINING CO.

MICHIGAN

Idle. Office: Leopold Bldg., Houghton, Mich. Mine near Phoenix, Keweenaw Co., Mich. Frederick W. Nichols, resident manager. Lands, 720 acres, being the S. $\frac{1}{2}$ of the S. $\frac{1}{2}$, Sec. 3, N. $\frac{1}{2}$ of Sec. 10, S. E. $\frac{1}{4}$ of Sec. 10, E. $\frac{1}{2}$ of the N. E. $\frac{1}{4}$ of Sec. 15, T. 57 N., R. 32 W., adjoining the holdings of the Ojibway, and just east of the old Manhattan mine.

NEW YORK COPPER MINING & SMELTING CO.

ARIZONA

Office: 46 North Stone Ave., Tucson, Ariz. Mines near Helvetia, Pima Co., Ariz. Frank H. Lee, pres.; Samuel Seinsheimer, vice-pres.; H. E. Heighton, sec.; Harry A. Drachman, treas.; Henry Buehman, gen. mgr. Organized Nov. 4, 1901, under laws of Arizona, capitalization \$500,000, shares \$1 par.

Property, 8 claims, 110 acres, about 8 miles from Vail station, on the Southern Pacific railway, in the foothills of the Santa Rita mountains, southeast of Tucson. Property has contact deposits between limestone and porphyry, developed by several hundred feet of trenching and stripping, showing carbonate and sulphide ores at surface, with 3 shafts, aggregating 175' in depth, and 3 tunnels, showing ore averaging about 4% copper, with gold and silver values. Assessment work only was done in 1912.

NEW YORK & MONTANA COPPER MINING CO.

MONTANA

Mine near Corbin, Jefferson Co., Mont. J. H. McCabe, general manager. Organized 1903, under laws of Delaware, capitalization \$1,000,000, shares \$1 par. Lands about 250 acres, including the Erickson, Scioto and Copper Gulch groups, opened by 3 two-compartment shafts, said to make a good showing of medium-grade ore. Idle many years, but pays taxes and is presumably waiting until a sale can be made.

NEW YORK-NEVADA GOLD-COPPER MINING CO.

NEVADA

Idle. Office: Chicago. Mine near Goldfield, Esmeralda Co., Nev. Jas. Rice, pres.; W. B. McConnell, vice-pres. and treas.; Geo. S. Webb, sec.; Harry F. Parker, gen. mgr., at last accounts. Organized Aug., 1907, under laws of Arizona, capitalization \$5,000,000, shares \$1 par.

Lands said to be 31 claims, include 12 claims, 3 miles from Copperfield, Esmeralda Co., Nev., 50 miles northwest of Tonopah, reported to

show veins of 7 to 12' width, carrying high-grade copper ores; 19 claims 12 miles northeast of Goldfield, near Red mountain, and a 5-acre mill site near Acme, Nev. The company claims to have 1 mile of workings, with 20,000 tons of ore blocked out carrying values in copper, lead, silver and gold, but this seems open to question. Letters to office and mine, 1913, unanswered, but not returned.

NEW YORK & SALTESE COPPER MINING CO. MONTANA

Organized 1906, capitalization \$5,000,000, shares \$10 par, as a reconstruction of the National Mining & Smelting Co. No trace of recent operations securable and company probably bankrupt.

NEW YORK-SEATTLE COPPER MINING CO. WASHINGTON

Idle. Mine near Index railway station, Snohomish Co., Wash. Harry D. Cowden, pres.; R. H. Hingston, sec.; Philip Hingston, treas. and supt., at last accounts. Organized Aug. 17, 1901, capitalization \$1,000,000, shares \$1 par.

Property, 8 claims, 160 acres in the Mineral City and Creek districts, about 13 miles by a good wagon road from the Great Northern railroad. Claims show 4 veins varying from 4 to 20' in thickness and carrying copper ore said to give an average return of \$14.42 per ton as determined by mill tests. Development consists of 212' shaft and about 1,250' of tunnel work.

Equipment includes an air compressor and saw mill, both run by water power. A concentrator of 60 tons capacity was operating some years ago, making concentrate shipped to the Everett smelter. Property closed down.

NEWBURY MINING CO. ARIZONA

Idle. Office: 49 Federal St., Boston, Mass. Mine office: Florence, Pinal Co., Ariz. W. V. Lander, vice-pres. and gen. mgr.; C. M. Schofield, supt., at last accounts. Organized 1901, capitalization \$2,000,000, shares \$10 par. Lands 22 claims, 440 acres, and a smelter site, on the Gila river. Mine, about 4 miles from Cochran station, on Arizona Eastern railroad was formerly worked for silver, and has 4 practically parallel veins, with silver values changing to copper at depth. Development includes a 300' tunnel and 4 shafts of 285' to 350', the mine said to have several miles of workings, with reserves estimated at 175,000 tons, claimed to average about 4% copper and \$6 gold per ton, with silver values. Equipment includes 300-h. p. steam and electric power, and a 15-drill air compressor. Shut down several years.

NEWFOUNDLAND SYNDICATE. NEWFOUNDLAND

Organized by Ricketts & Banks and associates, 80 Maiden Lane, New York. Incorporated under laws of New Jersey, Nov., 1904, capitalization \$300,000. Owned control of Pilley's Island Pyrites Co. and Terra Nova Co. both having cupriferous pyrite mines in Newfoundland. The National Metallurgic Co., another subsidiary, had a plant at Newark, N. J., for the extraction of copper from roasted pyrite and the nodularization of the residue to fit it for sale to iron furnaces.

NIAGARA COPPER CO. ARIZONA

Office: Prescott, Ariz. Mine office: Bagdad, Yavapai Co., Ariz. Herman Voge, pres.; Geo. H. Schuerman, vice-pres.; J. P. Bauder, sec. and gen. mgr.; preceding officers, J. K. Miller, F. L. Wright, W. H. Bauder and D. Levy, directors. Capitalization \$1,000,000, shares \$1 par, nonassessable.

Lands, 8 claims, unpatented, 160 acres, and a 5-acre mill site, adjoining the Arizona-Nevada Copper Co., in the Copper Creek district, 25 miles from Hillside, the nearest railway station. The property covers an area of mineralized schist, underlaid by disseminated glance ore similar to that of the Bagdad Co., and of undetermined extent, thickness and grade. There are also narrow seams and veinlets of high-grade ore. Most of the devel-

opment work has been on such rich, but erratic ore occurrences. The mine has 3 shafts and 6 tunnels, with about 2,500' of workings, showing ore bunches estimated to average 3 to 6% copper, 2 to 7 oz. silver and \$1 to \$10 gold per ton.

NIAGARA MINING & SMELTING CO.

UTAH

Is controlled, through ownership of a majority of issued stock by the United States Smelting, Refining & Mining Co., and property described under that title.

NIBLACK MINE.

ALASKA

Address: Niblack anchorage, Prince of Wales island, Alaska. A. A. Wakefield, agent. Property at one time worked by the Niblack Copper Development Co., afterwards the Niblack Copper Co., is reported to have reverted to the Geo. M. Wakefield Mineral Land Co. Fully described Vol. VIII. No work was done on the property in 1912 and 1913 save annual representation, but new development was reported to be underway in Oct., 1913, and the Niblack Copper Co. is said to still have a corporate existence.

NICHOLS COPPER CO.

NEW YORK & QUEBEC

Office: 25 Broad St., New York. Works office: Laurel Hill, Queens Co., N. Y. Employs about 1,500 men. W. H. Nichols, pres.; J. B. F. Herreshoff, vice-pres.; Geo. Martin Luther, sec. and gen. mgr.; Edw. R. Nichols, treas.; W. H. Nichols, Jr., auditor. Organized May, 1905, under laws of New York, capitalization \$10,000,000, reduced 1912 to \$7,000,000, shares \$100 par; bonds \$3,000,000, as successor of Nichols Chemical Co.

The Laurel Hill Works include a smelter and electrolytic refinery, with steam and electric power. Material treated in the smelter is mainly ore and matte and blister copper in the electrolytic plant.

The Laurel Hill smelter has 20 reverberatory furnaces, taking 40 to 250-ton charges, each furnace heating a tubular boiler with waste gases. There is 1 Herreshoff water-jacket blast furnace of 500 tons rated daily capacity. Matte and slag flow, in an uninterrupted stream, to a large settler, whence slag skims into pots and matte is tapped into an iron bed. Waste gases pass into a 1,000' main flue, of iron and brick, leading to a 300' chimney.

The Laurel Hill electrolytic plant is operated on the series system, and plant has 550 tanks. Anodes are cast. The final product is cast mainly into wire bars. This company enjoys a deservedly high reputation for the purity of its product and the efficiency of its metallurgical practice. Is the largest electrolytic refining plant in the world; capacity about 40,000,000 lbs. of copper per month.

The works do a very extensive custom refining business, treating mainly ores and matte from outside producers in the smelter, and western blister copper in the electrolytic plant. The works handle all the bessemer copper from the Phelps-Dodge properties, and from the Old Dominion, Calumet & Arizona, Shannon, East Butte, Granby and Ducktown companies, and others.

The company is a subsidiary of the General Chemical Co.

NINETY-NINE COPPER CO.

NEVADA

Office: Salt Lake City, Utah. Mine near Goodsprings, Clark Co., Nev. Jas. T. Hammond, pres.; J. B. Jenson, vice-pres.; L. N. Stohle, sec.-treas., at last accounts. Organized May 20, 1908, under laws of Arizona, capitalization \$1,000,000, shares \$1 par, nonassessable.

Lands, 14 claims, unpatented, 8 miles north of Goodsprings. Developed by shaft 400' deep in Dec., 1912, with levels at 50' intervals. The mine carries high-grade oxidized ore occurring as fissure veins in limestone. A

number of small shipments to the Salt Lake and Needles smelters have returned 20 to 30% copper.

Equipment includes a 15-h. p. gasoline hoist, and a 3-drill air compressor. Company plans erecting a mill at Jean, Clark county, Nev. Property considered promising.

NIPISSING COPPER & SILVER CO., LTD.

ONTARIO

Idle. Office: Toronto, Ont. Letter unclaimed at Cobalt, Nipissing, Ont. A. Aubin, pres.; Duncan Donald, vice-pres.; F. Asa Hall, sec.; T. Baycroft, mine mgr., at last accounts. Organized under laws of Ontario, capitalization \$3,500,000, shares \$1 par. Lands are claimed to be 2,200 acres, said to show a 19' vein of sulphide ore assaying 11% copper and 41 oz. silver per ton, which figures are their own refutation. Idle several years and presumably past resuscitation.

NONESUCH MINE.

MICHIGAN

Office: care M. P. O'Brien, 1705 Fisher Bldg., Chicago. Mine address: Ontonagon, Mich. A. K. Camp and M. P. O'Brien, owners.

Lands, 640 acres, in the Porcupine mountains, next west of the White Pine mine, being the S. $\frac{1}{2}$ of Sec. 1, and N. $\frac{1}{2}$ of Sec. 12, T. 50 N., R. 43 W. Property shows 2 parallel beds of sandstone ranging from 4 to 8' in width and separated by a bed of slate about 5' thick. Formation dips to the south and east at from 8 to 35°. The whole formation is badly faulted and of the 2 beds the upper appears to be the richer. Copper occurs in fine grains and flakes.

The property was tested, 1907-08, by the Calumet & Hecla Mining Co., drill borings showing copper in very fine particles, but in considerable quantities, and a mill test of selected rock yielded 12 to 15% copper. This mine was the first to be opened on the Nonesuch conglomerate and is developed by incline shafts of 650', 450' and 300', with about 2,000' of laterals.

An experimental mill with 3 gravity stamps, built by the Calumet & Hecla, is said to have given surprising results, although the Nonesuch rock has been believed, for 40 years, to offer almost unsolvable difficulties in milling, owing to the exceedingly flaky nature of its copper.

The underground work done by the Calumet & Hecla Co. yielded rich copper showings until cut off by a fault, beyond which the ground turned poor. Having no knowledge of the true geological conditions, the company allowed its option on the property to lapse. Following the abandonment of operations at Nonesuch, a thorough diamond-drill exploratory campaign was conducted by the Calumet & Hecla Co., on adjoining lands and it was here that the true situation was first learned. Drill borings disclosed the existence of 2 beds, so very similar in appearance and size that a deceptive shift of the lodes remained unproven until exposed in crosscutting. Faulting had brought the upper and richer lode on the one side in direct line with the lower and poorer lode of the other side.

The property has lain idle since Sept., 1908, save for a little work in 1912-13, when the workings were unwatered to get out a few tons of ore to treat in the new Lovett grinding apparatus, designed to roll the flake copper into pellets, recoverable by ordinary concentration methods.

NONPAREIL CONSOLIDATED COPPER CO.

WASHINGTON

Office: Mansfield, Ohio. Mine office: Index, Snohomish Co., Wash. Dr. S. P. Ecki, pres.; Monroe Harmon, vice-pres.; F. G. Mahlman, sec.; R. S. McCreery, treas. Lands, adjoining the Sunset, said to be extensive, well watered and timbered and show 3 veins. Development is by a tunnel, cutting a vein of 20' estimated width carrying a 7' paystreak of chalcopryite ore of good average assay tenor. No returns secured. Claims are being patented according to last reports.

NONPAREIL CONSOLIDATED MINING & MILLING CO. UTAH

Probably closed down. Letter unclaimed at Grouse Creek, Box Elder Co., Utah. Clayton C. Herrington, pres.; Thomas Sherry, sec.-treas. Organized June, 1905, under laws of Utah, capitalization \$400,000, shares \$1 par, assessable, and has levied assessments of \$12,000. Lands, 25 claims, unpatented, 20 miles from railroad, having a 100' shaft and about 1,300' of tunnels, showing auriferous and argentiferous copper ore.

NONPAREIL COPPER MINING CO.**IDAHO**

Idle. Office: Wallace, Idaho. Mine near Mullan, Shoshone Co., Idaho. Amos M. Stroud, pres. and gen. mgr.; Jas. A. Wayne, sec., at last report. Lands, 8 claims, patented, on the west fork of Willow creek, across from the Carney mine, 3 miles southeast of Mullan. Development is by 4 tunnels, No. 1 being 74' and No. 4, the lowest, being 114'. Surface ores have given assays up to 1.5% copper, and 8 to 19 oz. silver per ton. Property is regarded as worthy of further development, judging from the reports received.

NORFOLK SMELTER.**VIRGINIA**

See Virginia Smelting Co., West Norfolk, Va.

NORSEMEN EXPLORATION CO.**BRITISH COLUMBIA**

Office: 424 Second Ave. So., Minneapolis, Minn. Mine office: Capsheaf, Van Anda, Texada island, B. C. E. E. Rorem, pres.; W. H. Curtis, vice-pres.; C. A. McKenzie, sec.; Allen T. Rorem, treas.; P. G. Adland, E. F. Laffin, A. E. Barker and Eden Schmidt, directors. Incorporated under laws of Arizona, capitalization \$500,000, shares \$1 par; issued, \$325,000.

Property, 26 claims, 1,200 acres, 730 patented, on Texada island, B. C. Land is heavily timbered and shows contact deposits between limestone, granite and diorite. Copper occurs as chalcopyrite and bornite, with gold and silver values. The Capsheaf claim has an 80' vertical shaft, showing 10' of ore, carrying 14% copper and \$11 in gold in the samples reported as taken from surface down to 59'. Ore expected by manager to average 4% copper and \$6 gold and silver. The Cameron claim adjoining the Texada Iron mine has an iron capping of magnetite with irregular streaks and patches of chalcopyrite thought by management to average 4% copper. The Aladdin claim carries silver-lead ore.

Company's property is about 3 miles long, convenient to tide water and only 20 miles from a smelter. Corporation is a land-holding company and will develop claims and dispose of them to other parties. Property regarded as promising.

NORTH AMERICAN COPPER CO.**NEW MEXICO**

Idle. Mine near Lordsburg, Grant Co., N. M. C. E. Woodnutt, pres. and gen. mgr. Wm. M. Gilland, supt. Organized April 30, 1906, under laws of Arizona, as successor of North American Mining Co., capitalization \$750,000, increased later to \$1,000,000, shares \$1 par, nonassessable; issued, \$800,000. Annual meeting, last Tuesday in April.

Lands, 14 claims, unpatented, in the Pyramid and Virginia districts, including the Nellie Bly and Cobre Negra groups. Property shows andesite, diorite and trachite, having 8 orebodies, reported by the management as fissures running parallel with porphyry dikes.

The Nellie Bly mine, in the Pyramid district, 8 miles southwest of Lordsburg, has shafts of 450', 125', 65', 33' and 40', with about 6,000' of workings. The 400' level shows a vein of 12' estimated width, with bornite-chalcopyrite ore said to average 5.8% copper and 5.5 oz. silver per ton.

The Cobre Negra mine, in the Virginia district, 6 miles southwest of Lordsburg, idle since 1906, is reported to carry melaconite, malachite, azurite and chalcopyrite, and is developed by shafts of 332', 180', 60', 85' and 85'.

Equipment includes a 40-h. p. hoist, good for 600', at the Nellie Bly

mine, and several mine buildings and 4 dwellings. Company said to have a 50-ton concentrator, known as the Lena, but this is not in commission.

The company shipped, 1907, to the Douglas and El Paso smelters, 98 carloads of ore, netting \$43,333.36, when copper was selling at 19 cts. per pound.

NORTH AMERICAN MINE.

MISSOURI

D. P. Shuler, manager, P. O. Box 67, Frederickstown, Madison Co., Mo. Held by Wm. F. Carter, Mercantile Trust Co., St. Louis, Mo., in trust for owners. Property formerly owned by North American Lead Co., was bid in at foreclosure sale Nov., 1910. Mine has copper as well as lead and was a notable producer in 1908-09. Idle since 1909, but expected to be reopened in 1913. Described Vol. VIII.

NORTH AMERICAN SMELTER & MINES CO.

COLORADO

Office: Boston Bldg., Denver, Colo. Mine office: Idaho Springs, Clear Creek Co., Colo. Works office: Golden, Jefferson Co., Colo. Organized 1909, under laws of Colorado, capitalization \$2,000,000, shares \$1 par. Has \$500,000 issue of 5% convertible bonds, on which interest being in default a receiver was appointed Oct., 1912. Property was sold at receiver's sale and bid in for \$215,000 for a reorganization committee. A new company is said to be formed to provide \$500,000 cash to improve the Golden smelter and to build a 300-ton concentration mill to handle low-grade ores.

The Donaldson group includes about 400 acres, patented, the former holdings of the Banner Consolidated Mines Co., International Gold Mining Co., Centurion Mining Co., Donaldson Mines Co., Champion Comstock Mining Co. and Prosperity Mining Co. The mines, carrying 2 main veins, for a length of about 6,000', have about 12,000' of workings, deepest nearly 1,600', ore being extracted through the Rockford tunnel. Equipment includes steam power, but properties are equipped with electric current.

The Donaldson mine, operated under lease by the Rockford Leasing Co., with John Larson as manager, has a well-defined vein exposed for a mile across the property. A "strike" of \$500 ore, carrying free gold as well as copper was made in Feb., 1913, but the ore streak where mined at a depth of 800' is said to average \$40 per ton.

The Golden smelter is an excellent plant with a Vivian sintering furnace and 2 blast furnaces of 500 tons rated capacity, making matte and doing a custom business. The equipment is electric throughout and the plant capable of doing cheap work. There are several old slag dumps, some of which may be worth resmelting. There is an 80-acre limestone quarry, 4 miles from the works.

NORTH BINGHAM CONSOLIDATED MINING CO.

UTAH

Office: Provo, Utah. Mine office: Bingham Canyon, Salt Lake Co., Utah. Jesse Knight, pres.; Wm. W. Mathews, vice-pres.; W. Lester Mangum, sec.-treas., and J. Wm. Knight, directors. Organized June, 1907, under laws of Utah, capitalization \$100,000, shares 10 cts. par, assessable; levied a one-half ct. assessment, 1910. Is controlled, through stock ownership, by the Knight Investment Co.

Lands, 6 claims, in Barney canyon, having a very wide ore zone, showing leached ore carrying traces of copper and up to \$2.80 gold per ton. Mining work, begun 1909, includes a tunnel of about 1,000', and a 2-compartment shaft. Property is considered a good development proposition.

NORTH BUTTE EXTENSION DEVELOPMENT CO.

MONTANA

Office: 25 Broad St., New York. Mine office: O'Rourke Estate Bldg., Butte, Mont. C. W. Peters, pres.; N. Bruce MacKelvie, vice-pres.; A. B. Wolvin, treas.; A. J. Ronaghan, sec.; preceding officers, Elbridge L. Adams, David Angus and Keith Stewart, directors. Organized Oct. 10, 1908, capi-

talization \$1,500,000, shares \$1 par; issued, \$1,349,036. Company owes (Oct., 1913) \$19,994 to the Butte & Superior Copper Co. for funds advanced. Is a reconstruction of the North Butte Extension Copper Mining Co., which was a reorganization of the North Butte Extension Mining Co. A controlling stock interest of \$800,000 was sold, March, 1910, to the Butte & Superior Copper Co. Annual meeting in September.

Suit was instituted by the Butte & Superior interests against the promoters of the North Butte Extension Development Co. to recover shares of stock claimed to have been illegally issued and a proposal to return 50,000 shares was made and accepted by the company, though the final details of the settlement have not yet been made public.

Apparently the company's only present property is the Overman claim, now owned outright, the Black Crow fractional claim of $2\frac{1}{2}$ acres and the Clipper and Assay mill sites. Development is by a 700' shaft, planned to be deepened to 1,000'.

Most of the ground on which the various North Butte Extension companies were organized was held only under options which were forfeited. The Occidental claim was developed by a long crosscut from the Butte & Superior shaft, but nothing of importance was found and after payments of \$90,000 the claim was abandoned. Much of the original ground held by the company is now owned by the Rainbow Development and Butte & Superior companies.

According to the contract with the Butte & Superior Co. the latter company has to drive a heading from the 1,200' level of its Black Rock shaft to the east end line of the Black Rock claim, then through the entire length of the Four Johns claim and then through the entire length of the Overman claim belonging to the North Butte Extension Co. Up to Sept. 1, 1913, this heading has been extended 1,260', approaching the easterly line of the Four Johns claim, and it is expected that it will be extended into the Overman claim in the early part of the coming year. The management states that as soon as development work has advanced sufficiently to warrant it, a report will be made to stockholders.

NORTH BUTTE MINING CO.

MONTANA

Office: 1400 Alworth Bldg., Duluth, Minn. Mine office: Butte, Mont. Thomas F. Cole, pres.; Charles A. Duncan, vice-pres.; Joseph B. Cotton, vice-pres. and gen. solicitor; Frederic R. Kennedy, sec.; Daniel R. Smith, asst. sec.; Edward J. Maney, treas.; Henry B. Paull, auditor; preceding officers, Daniel M. Clemson, W. J. Olcott, J. U. Sebenius and C. A. Congdon, directors. American Trust Co., Boston, Mass., transfer agent; Old Colony Trust Co., Boston, registrar. Stock listed on Boston Stock Exchange. John D. Pope, gen. mgr. Organized April 5, 1905, under laws of Minnesota, capitalization \$9,000,000, shares \$15 par; issued, \$6,150,000. The annual report for year ending Dec. 31, 1912, showed total receipts, \$5,120,221; operating expenses and improvements, \$3,449,503; net profits, \$1,670,912; dividends paid, \$697,000; surplus for year, \$973,718. Assets—mining property, \$7,876,171; cash, copper, and accounts receivable, \$1,617,210; bills payable, \$600,506; total surplus, \$2,800,779.

Gross earnings have been as follows: \$5,005,788 with net profits of \$2,720,670 in 1906; gross \$6,694,844 and net \$3,623,162 for 1907; gross \$2,703,971 and net \$857,880 for 1908; gross \$4,876,603 and net \$2,016,749 for calendar year 1908; gross \$4,082,880 and net \$1,086,421, 1909; gross \$3,790,991 and net \$560,888, 1910; gross \$3,752,160 and net \$641,857, 1911; gross \$5,120,322 and net profit \$1,670,719, in 1912. For year ending March, 1907, ore produced returned about 7% fine copper, shrinking in 1908 to 5% and in 1909 to an average of 3.77% copper. This increased to 6% in 1912.

Dividends are paid quarterly and have been as follows: \$1.25 in 1905; \$7.25 in 1906; \$6 in 1907; \$3 in 1908; \$4 in 1909; \$1.10 in 1910; \$1.20 in 1911; \$1.70 in 1912. A regular quarterly of 50 cts. was declared Sept., 1913, making total dividends, \$10,850,000.

To give holdings more regular outline exchanges have been made between the North Butte and Anaconda companies, the Anaconda securing fractional interests in the Emily claim, adjoining the Berlin claim on the west, for cash, and concessions regarding the Edith May vein, preventing future controversy over the western extension of that vein. The North Butte secured a five-sixths interest in the Sioux Chief claim, giving up a small portion of the western end of the Gem and a part of the Adirondack claim.

Litigation with the Tuolumne Copper Mining Co. was settled Nov., 1910, the North Butte obtaining absolute ownership of the disputed part of the Jessie vein, and the Tuolumne obtaining absolute ownership of the ground formerly owned jointly on which the North Tuolumne vein apexed. The Tuolumne thus gained the eastern 412' of the Jessie vein, below the 400' level, while the North Butte secured title to the vein in the eastern 412' above the 400' level, as well as confirmation of its title to all of the Jessie vein lying west of the 412' tract, through the remainder of the Jessie claim, a distance of about 1,100'.

Property comprises a solid block consisting of the following claims: Edith May, Copper Dream, Miners Union, Jessie, Hancock, Ground Hog, Paul, Croesus, Snowball, Lynchburg, John Emmit, Henry, Berlin, Leaf, Gustavus, Eva, Margaretha, with fractional portions and undivided interests in the following claims: Speculator, Adirondack, Sioux Chief, East Gem, West Gem, Carlile, Protection, Granite Mountain, Sunset. The last named was acquired in 1912, during which year options and partial payments were made on a number of additional mining claims in the Butte district. A one-half interest in the Granite Mountain claim was acquired from the Lewisohns, the company to sink at its own cost the existing 500' shaft to a depth of 2,000' with connection on the 200' level. Title to the shaft remains with the North Butte.

Property is traversed by a number of fault veins, mostly belonging to the Blue fissure series. These veins carry high-grade ores in shoots, which have thus far been remarkably persistent in depth. The ores carry much primary chalcocite, frequently massive, with considerable quantities of enargite and smaller proportions of other sulphides. All ores carry silver and lesser gold values. The veins are "heavy," requiring close attention and timbering with square sets, monthly timber used being about 1,000,000' board measure. No waste is hoisted, all being used for dry-filling. Waste is largely low-grade ore, a portion of which may be available for smelting at some future date and which can be extracted easily.

The exploration of the vein system has shown the necessity of thorough drifting along the veins at considerable depth and development on the 2,200 to 2,800' levels has opened up large orebodies, dispelling the fear felt by many men that the rich ores found on the 1,600 to 1,800' levels would be succeeded by impoverishment below.

The principal ore supply of the company comes from 8 northwest veins, known as the Adirondack, Edith May, Jessie, Gem, South Gem, North Croesus, South Croesus and Snowball. The Edith May and the Jessie vein were the principal ore producers of the North Butte at the inception of the company.

The Edith May is 18 to 42' in width, opened at 200' intervals from the 800' level downwards. The vein was of little value until the 1,200' level was

reached, after which there was a marked improvement culminating in the 1,800' level, which developed a vein up to 42' wide, carrying phenomenally high-grade ore, many of its stopes being practically all first-class ore for a distance of about 1,000' along the floor. The 2,000' level showed a slight decrease in average value as well as in the length of the ore shoot, while the 2,200' level showed a truly alarming falling off, the ore being of much lower grade than before and payable for only 300' in length as against a length of 1,000' on the 1,800' level, where the ore was mainly chalcocite and bornite, with considerable enargite. In 1912-13, new work disclosed a foot-wall 7' band of 5% ore for 300' on the 2,400' level, comparable with that first mined. Besides this the vein has a fine hanging-wall orebody, which, on the 2,600' level, shows 4' of 5% ore opened for but 50' in July. These orebodies have largely restored the prestige of this vein. The Edith May vein divides, east of the shaft, showing no commercial ore in the south branch, but these branches unite some distance west of the shaft. On the 2,000' and 2,200' levels, there are 2 fault planes, defining the limits of the better grade of ore, these faults diverging in their downward course.

The Jessie vein ranks next to the Edith May in production and promise. Where opened on the 700' level in the Gem crosscut, the Jessie showed a vein of about 10' width with bunches of 6% ore. The ore shoot found on the 1,200' and 2,200' levels was high grade, 8' wide and nearly 1,000' long, changing in character below this depth and showing considerable sphalerite in the drifts to the west. On the 2,200' level, the vein is about 12' wide, showing some ore up to 5% in copper tenor, but averaging materially lower than the ore in the workings above. The west drift on the 2,000' level opened a 150' ore shoot, 6' wide, carrying 6% copper and 7.5 oz. silver. The 2,200' level shows low-grade ore only. The 2,600' drift showed 4' of 3.5% ore displaced by a fault 15' from the crosscut and not yet recovered (July, 1913). On the 2,800' level, vein where cut is broken by a fault, and the value is undetermined.

The Croesus vein, now called the North Croesus, is opened by drifts on the 1,800', 2,000', 2,200' and 2,400' levels, developing a large and important orebody between the 1,600' and 2,000' levels. On the 1,800' level, the ore shoot is 8½' wide and averages 8 oz. silver per ton; on the 2,000' level, the shoot is 300' long averaging 10' thick of 3% copper and 6 oz. silver; the shoot is not yet cut on the 2,200' level, but on the 2,400' another ore shoot, 300' east of the one just noted, shows 2' of 3% ore with 7 oz. silver per ton.

The South Croesus vein has been opened on the 1,600', 1,800', 2,000' and 2,200' levels, with ore on each level; giving the best showing on the bottom level, 2,200'. It has carried from 3 to 4' of ore in shoots, the longest being 270', averaging 5.5% copper and 5.5 oz. silver.

The Gem vein shows no ore of commercial importance above the 1,600' level, but carries ore on that level, and the 1,800' level has about 6' of 4.5% ore. It is developed to a small extent on the 18th, 20th, 26th and 28th levels, both value and width increasing with depth, the 2,800' level showing 12' of 5.3% ore carrying 2.2 oz. silver per ton. The vein is irregular in size and grade and where developed has been broken by cross faults.

The Adirondack vein, like the Gem, shows no commercial ore above the 1,600' level, but shows an ore shoot 60' long on the 1,800', 160' on the 2,200' and 300' long on the 2,400' level, widening proportionately. On the 2,400' level the orebody is 12' wide, 300' long and assays 5.25% copper and 3 oz. silver; on the 2,600' level the crosscut shows 7' of 3.5% ore and the drift shows 4' of 3% ore.

The Snowball vein has characteristically high silver values. It was first cut on the 18th level in 1910 and has been proven to carry several splendid

orebodies by the development work of 1912-13. On the 1,800' level it has $1\frac{1}{4}$ ' of 4% ore with 4 oz. silver, for 100'; 4' of 3% ore with $5\frac{1}{2}$ oz. silver for 250' on the 2,000' level; 5' of 8% cu. and 8 oz. silver ore for 200' on the 2,200' level with both faces in ore (June 30, 1913), and $6\frac{1}{2}$ ' of 4% cu. and $7\frac{1}{2}$ oz. silver ore for 150' on the 2,400' level. Same shoot shows on 2,800' level.

Development on the property is very extensive, aggregating many miles of workings. New development for 1912 amounted to 18,140' compared with 17,000' in 1911 and comprising 15,391' of drifting and crosscutting. On the completion of the Granite shaft to the 2,800' level in Dec., 1913, this will be made the working shaft and equipped with a hoist good for 5,000', permitting greatly increased development.

The Speculator shaft from which all ore is hoisted was enlarged to 4 compartments when the mine was bought and has since been deepened to 2,800' with levels at 200' intervals, from and below the 1,400' point, developing all the veins worked in the mine. The Speculator shaft has a 128' steel headgear standing on a 41x60' concrete foundation, equipped with self-dumping skips and pockets, with daily capacity of 1,500 tons of ore, no waste being hoisted, as it is used for underground filling.

The 500' Jessie, 700' Gem and 500' Adirondack shafts are idle and of no present value. The Granite Mountain shaft, 2,600' deep, Aug., 1913, is connected with the main workings on the 700', 1,000', 1,200', 1,600', 1,800', 2,000' and 2,200' levels.

The different veins of the extensive system possessed by the North Butte are opened mainly from the Speculator shaft, regardless of old shafts and boundary lines of the claims, the work having been done as seemed most advantageous.

Underground haulage is done with electric motors on the 1,800 to 2,800' levels.

The main machinery plant and buildings are at the Speculator shaft. The engine house has a 20-ton traveling crane, and a 32x72" Nordberg Corliss duplex-cylinder hoist, operating 2 cages in counterbalance, with two 8-ton Kimberly skips swung under, each hoisting with $1\frac{1}{2}$ " round cable, and good for depth of 3,500'. An 18x36" duplex cylinder auxiliary hoist operates a double-deck cage, in a third compartment, for handling men, material and timber, and the shaft has a fourth compartment for ladders and pipes.

The 24x70' compressor house has an air compressor with piston efficiency of 3,482' of free air per minute, reduced to a pressure of 70 lbs. per sq. inch, capable of operating 40 to 50 rock drills. A new 4,000 cu. ft. compressor was installed in 1912. The boiler house, enlarged 1909, has two 500-h. p. and five 100-h. p. boilers. Miscellaneous buildings include a machine shop, smithy, carpenter shop, planing mill and a plate shop for repairing skips.

The North Butte ore is smelted by the Washoe works of the Anaconda under a new contract by which the company pays the smelter charges to the Anaconda Co. and the copper is turned over to the North Butte Co. and sold by its own agents, effecting a saving of \$150,000 or more a year.

Costs per pound of copper produced in 1912 were as follows: Mining and development, \$0.06977; freight, \$0.00197; concentration, smelting, transportation of metal, refining and selling, \$0.05689; construction, \$0.0008; a total of \$0.12943, compared with \$0.1236 in 1911, \$0.1242 in 1910 and \$0.8961 in 1909. Deducting value of gold and silver, cost per pound of copper in 1912 was \$0.09652.

Ore reserves, Dec. 31, 1912: 710,920 tons of 4.5% copper and $4\frac{1}{4}$ oz. silver; Speculator vein, 4,100 tons; Adirondack, 4,400; Edith May, 337,150; Croesus, 20,310; South Gem, 39,530; Snowball, 159,850; Jessie, 145,580 tons.

Reserves increased largely in 1912 and in July, 1913, were higher than at any previous time in the company's history, with high silver values due to the Snowball vein.

Output in 1912 was 434,854 tons of ore, or 425,248 tons of dry ore and 49 tons dry precipitate, of which 45,349 tons were first-class ore and the balance, or 89.3%, concentrating ore. Production has been as follows: 30,954,788 lbs. fine copper in 1905; 32,895,907 in 1906; 16,479,062 in 1907; 36,929,028 lbs. copper, 1,283,761 oz. silver and 1,593 oz. gold in 1908; 33,102,153 lbs. copper, 1,048,272 oz. silver and 1,302 oz. gold in 1909; 25,267,092 lbs. copper, 998,190 oz. silver and 1,195 oz. gold in 1910; 24,816,669 lbs. copper, 1,280,947 lbs. of silver, 1,280 oz. gold in 1911; 26,480,123 lbs. copper, 1,377,468 oz. silver and 1,367 oz. gold in 1912. Present production is at the rate of 2,225,000 lbs. copper a month, which cannot be exceeded until the new shaft is in commission.

The North Butte had a spectacular rise as a heavy copper producer and a dividend-paying mine of the first rank, and had an almost equally spectacular drop, due partially to the blighting effects of the 1907 panic, and also to the decrease in values in the Edith May vein, shortly after the panic.

NORTH CAROLINA MINING CO.

NORTH CAROLINA

Idle. Operating office: Webster, N. C. Mine near Medlin, Swain Co., N. C. Winfield Scott Adams, general manager, at last accounts. Lands, 200 acres, known as the Everett mine, including a good smelter site, and lands available for water power development, on Hazel creek, in the Smoky mountains. Developed by tunnel, showing mainly chalcopryite, with some melaconite, and native copper, ores being said to average about 6% copper. Equipment includes a steam plant and a 4-drill Rand air compressor. Company in litigation over titles from 1899 until 1910, when they won the suit.

NORTH DOUGLAS COPPER CO.

NEVADA

Address: H. D. McMasters, owner and manager, Ludwig, Lyon Co., Nev. Property north of the Nevada-Douglas and just south of the Kaufman-Randall group. Development consists of a 350' tunnel that has encountered commercial ore, according to press reports.

NORTH FORK GOLD & COPPER MINING CO.

IDAHO

Office: 520 Cedar St., Wallace, Shoshone Co., Idaho. Mine at Nelson Siding, Shoshone Co., Idaho. Curtis Lightner, pres. and mgr.; Victor E. Waltman, vice-pres.; John Dolan, sec.-treas.; preceding officers, Jesse Freeman, Wm. Sites and J. E. Lightner, directors; Myron Lightner, supt. Organized Dec., 1908, under laws of Idaho, capitalization \$1,000,000, shares \$1 par, assessable; issued, \$50,000. Annual meeting, third Saturday in April.

Property, 9 claims, unpatented, and a 7-acre mill site, on the North fork of the Cœur d'Alene river, 13 miles from Enaville, shows two 4' fissure veins, in Revette quartzite, carrying lead and copper ores, latter being in the form of chalcocite, estimated to average 7% copper, 10 oz. silver and \$4 gold per ton. Development is being carried on at the Silver Creek tunnel, which follows the vein and has encountered stringers of copper ore in the hanging wall at 290', though not yet beneath the ore chimney found above. The older workings comprise a 40' upper and 65' middle tunnel estimated by management to show 25,000 tons of ore. Equipment includes a hoist and 3 mine buildings.

NORTH LAKE MINING CO.

MICHIGAN

Office: 60 Congress St., Boston, Mass. Operating office: Sheldon Bldg., Houghton, Mich. R. M. Edwards, pres. and gen. mgr.; Henry Tolman, treas.; preceding officers, S. L. Powers, Arthur C. Paine, I. J. Sturgis; sec., A. L. Wyman, directors. Organized Aug. 26, 1908, under laws of Michigan, capitalization \$2,500,000, shares \$25 par; fully issued, \$9 paid in. Company

paid \$144,000 for 360 acres of land, bought of St. Mary's Mineral Land Co., one-half in cash and one-half in 9,000 shares of stock at \$8. Company began business with full title to lands and \$300,000 cash in the treasury. The company suffered heavily by the failure of S. R. Dow & Co., Sept., 1912, losing \$160,188 in cash and interest unlawfully borrowed by its former president, S. R. Dow, and at the end of 1912 was \$19,000 in debt. This indebtedness was wiped out by an assessment of \$1 per share, levied April 18, 1913, and company was again in comfortable financial condition Sept., 1913. Federal Trust Co., Boston, registrar; American Trust Co., Boston, transfer agent. Shares are listed on the Boston stock exchange. Annual meeting, third Thursday in April.

Lands 1,120 acres, in Secs. 28, 29, 32 and 33, T. 51 N., R. 37 W., lying immediately north and east of the Lake Copper Co. Property was supposed to carry about 7,000' of the strike of the Lake amygdaloidal bed, but apparently the Lake bed curves to the westward, rather than to the east. Property also carries the copper-bearing series of the Evergreen belt of amygdaloidal beds, and various other unidentified cupriferous strata. The company's lands are crossed by the Fire Steel river, and are traversed by both the Mineral Range and Copper Range railways.

Exploratory work has been planned thoroughly and systematically, the preliminary work consisting of diamond drilling to give 2 complete cross-sections, of about 8,500' and 9,500' respectively, to determine the strike and dip of all the strata on the property. These sections are about 1,000' apart, and the contact of the Keweenaw series with the eastern sandstone has been definitely located by drilling. Numerous drill holes have been bored, with depths ranging from 200' to more than 2,000'.

Diamond drilling was begun 1909, and ended 1911, with the No. 15 hole. Several cupriferous amygdaloidal beds were disclosed, and 2, underlying Nos. 6 and 8 conglomerates, have been correlated as extensions of Nos. 1 and 2 of the Adventure series of lodes. No. 1 bed, of about 33' width, showed 10' fairly charged with copper and No. 2 bed was lean. The formations above No. 8 conglomerate bed are practically unexplored, and excepting the work done in holes Nos. 3 and 7 remain entirely untouched. The results obtained from holes 3, 7 and 13, below this conglomerate bed, were very promising and a vertical shaft was therefore started July, 1913, in the vicinity of No. 3, and is 300' deep with a drive into the hanging-wall country 100' long, Sept., 1913.

Equipment includes a Nordberg hoist good for depth of 1,200' and a small air compressor. There is also a boarding house and other necessary mine buildings.

The North Lake is an exploration company, but in view of the encouraging results secured by diamond-drill borings on this and adjoining properties, is considered promising and the present management is good.

NORTH LARAMIE PEAK COPPER MINING CO. WYOMING

Office: Douglas, Wyo. Mine office: Saul's Camp, Esterbrook, Converse Co., Wyo. H. C. Saul, pres.; L. V. Saul, sec.; W. C. Saul, treas. Organized 1908, under laws of Wyoming, capitalization \$2,000,000, shares \$1 par, fully paid and nonassessable. Property, 22 claims, 440 acres, in the North Laramie Peak district. Claims show pre-Cambrian schists bordering granite contacts, on which 1,000' of diamond drill work has proven existence of a flat body of disseminated chalcopryite ore 40' wide. A shaft has been sunk 90' on a chimney of chalcopryite ore said to assay 10% copper, 6 oz. silver and \$2 gold, for a total width of 5'. A second 80' shaft, also in ore, will be deepened to 300'. Two diamond drills are at work on the property and an 800' hole was started in May.

Equipment includes 50-h. p. boiler with 8x10" hoist and a 3-drill compressor. Is a close corporation, entirely owned and financed by Messrs. Saul.

NORTH ONTARIO REDUCTION & REF. CO., LTD. ONTARIO

Idle. Office: 88 Yonge St., Toronto, Ont. Works office: Sturgeon Falls, Nipissing, Ont. Lieut.-Col. J. I. Davidson, pres.; A. Ansley, vice-pres.; J. J. Wright, sec.; O. L. Young, supt., at last accounts. Organized 1906, under laws of Ontario, capitalization \$500,000. Company owns a smelter, between Sudbury and North Bay, built to treat the silver-cobalt ores of the Cobalt district and the copper ores of the Nipissing and Algoma districts. No returns secured.

NORTH POLE MINING CO. COLORADO

Idle. Office: Aspen, Colo. Mine near Crystal, Gunnison Co., Colo. Jas. T. Stewart, chairman and gen. mgr.; Geo. N. Smalley, vice-pres.; W. Porter Nelson, sec.; Frank Meyer, treas.; preceding officers, James R. O'Hara, Geo. H. Poor and A. T. Ferris, directors, at last accounts. Organized 1902, under laws of Colorado, capitalization \$500,000, shares \$5 par.

Lands, 37 claims, 640 acres, in the Rock Creek district, showing fissure veins, three of 3' average width, with tunnels of 340', 680', 450', 300' and 600', a total of 3,000' of openings, estimated to show 50,000 tons blocked out, ore being chalcopryite in quartz, claimed to average 8% copper, 1.5% lead, 2% zinc, 8.75 oz. silver and \$1 gold per ton. Equipment includes a 50-h. p. steam plant, a 7-drill air compressor and several buildings, including a 15x30' machine shop.

NORTH STAR MINING CO. WASHINGTON

Idle. Controlled by Chelan Consolidated Copper Co. See Vol. X.

NORTH UTAH MINING CO. OF BINGHAM. UTAH

In liquidation. Property sold to Hon. Judge Dyer, Portland, Me., for bondholders and transferred to the Mineral Lands Co. See Vol. X.

NORTHERN BELL MINING CO. MONTANA

Mine address: Princeton, Granite Co., Mont. J. D. Fields, manager, in 1912. Owns Northern Bell group of claims developed by 100' shaft showing a vein with sulphides carrying copper and gold. A raise connects with the tunnel above.

NORTHERN LIGHT COPPER CO. NEVADA

Address: Yerington, Lyon Co., Nev. D. W. McKenzie, lessee. Property, 6 claims, 20 miles east of Yerington. Operators said to have shipped 16.4% copper ore in May.

NORTHERN LIGHT DEVELOPMENT MINING CO. ALASKA

Idle. Mine address: Latouche, Latouche island, Alaska. Organized about 1909, under laws of Washington, capitalization \$1,000,000, shares \$1 par. Lands, 6 claims, on an island in Prince William sound, opposite Latouche island, slightly developed by tunnels, with about 250' of workings. A blind shaft, sunk from a crosscut, shows 6' of auriferous and argentiferous chalcopryite. Property has necessary mine buildings. No returns secured.

NORTHERN ONTARIO CONS. COPPER CO., LTD. ONTARIO

Idle. Mine near Dean Lake, Algoma, Ont. Dr. John H. Gimby, president. Organized Oct. 17, 1906, under laws of Ontario, as a reconstruction of the Northern Ontario Copper Co., Ltd., capitalization \$1,500,000, shares \$5 par; issued, \$750,000.

Property, the Lizert and Bronson mines, 768 acres, partly owned, partly leased, in Thompson and Cobden townships, showing 2 contact veins of about 9' width. One vein occurs between slate and trap dike with granite, quartzite, slate and trap impregnated with chalcopryite. No. 1 shaft, 9x16', with 3 compartments, on the south vein, 130' deep, shows ore giving assays

up to 4.6% copper, 2.5 oz. silver and \$1 gold per ton. Several small shipments of ore, selected, carried 13.83% copper.

NORTHERN SIERRA MADRE MINING CO.**MEXICO**

Address: D. E. Alexander, 845 Pacific Bldg., San Francisco, Cal. Mine near Soyopa, Sonora, Mex. Chas. K. Blender, pres.; Carlo Giovannetti, vice-pres.; John O'Donnell, sec.; Fred Townsend, treas.; preceding officers, D. E. Alexander, Fred Trevarrow and E. C. Curtis, directors; F. R. Luckhardt, gen. mgr. Organized Aug. 2, 1901, under laws of California, capitalization \$300,000, shares \$1 par.

Lands, 167 acres, in 4 groups, including La Reina de Cobre and Providencia copper mines and El Colosus silver-lead mine, 25 miles west of Suaqui de Batuc. Property shows diabase, shale and limestone, reported by the management to have 5 orebodies, with 3 under development, of 2' average width, carrying oxidized and sulphide ores, with quartz gangue, estimated to average 15.5% copper, 20% lead, a trace of zinc, 73 oz. silver and \$8 gold per ton. Development is by a 37' crosscut tunnel and by drift tunnels of 100', 418' and 115', with 633' of workings, and management estimates 4,854 tons of ore in sight, with 3,214 tons blocked out for stoping. Closed down owing to Mexican revolution.

NORTHLAND COPPER-GOLD GROUP.**ALASKA**

Office: Ernst & Buddenborg, 518 Hinckley Bldg., Seattle, Wash. Property consists of 8 claims, in Ketchikan district, west coast of Prince of Wales island, southeast Alaska. Property said to show a 600 to 800' mineral zone containing numerous veins, traceable for 3 miles. Claims show limestone and greenstone porphyry intrusions, with flat dipping veins alongside, that run northeast and southwest. The veins are from 1 to 8' thick and contain lenses of ore with chalcopyrite mixed with pyrite, lying beneath the green stone hanging wall.

Development consists of a 70' crosscut tunnel showing low-grade ore and a 50' shaft, 3,000' distant, showing 3' of ore the entire depth. A 112' tunnel taps this shaft and shows 18" solid 20% ore, according to owners. Shipments of 153 tons are said to have returned 10.05% copper, 26.3% iron, 14.2% silica, \$1.38 in silver and gold, or a total value of \$19.84 per ton. Smelting rate to Tacoma is \$1.50 per ton for this ore; 44 tons shipped Dec., 1912, averaged 7.85% copper and 55 tons shipped May 27, 1913, averaged 7.39% copper, according to owners.

NORTHLAND DEVELOPMENT CO.**ALASKA**

Idle. 205 Colman Bldg., Seattle, Wash. Mine address: Dolomi, Prince of Wales Island, Alaska. A. B. Hill, pres.; C. D. Calhoun, vice-pres.; P. A. Tucker, sec.-treas. and gen. mgr. Organized March 18, 1908, under laws of Washington, capitalization \$100,000, shares \$1 par, nonassessable.

Lands, 11 claims, in the Ketchikan district, showing 3 contact deposits between limestone and greenstone, of which 1, under development, of 4' estimated average width, traceable 3,000', carries chalcopyrite, with schistose gangue, estimated by the management to average 10% copper, 3 oz. silver and \$1 to \$6 gold per ton. Development is by two 70' shafts and 3 drift tunnels, with 2,000' of workings.

Equipment includes steam power and an air compressor and the management planned a 1,800' ground tram to tidewater. A test shipment of 3 tons sampled 10% copper. Company probably reorganized as Northland Copper Gold Group.

NORTHPORT SMELTING & REF. CO., LTD.**WASHINGTON**

Office: Northport, Stevens Co., Wash. Anthony J. McMillan, president. Company is controlled through stock ownership by the Consolidated

Mining & Smelting Co. of Canada. Company owns the Northport smelter, idle for several years. Described Vol. X.

NORTHWEST CŒUR D'ALENE ITALIC COPPER MINING & DEVELOPMENT CO.

IDAHO

Idle. Mine in Priest River district, Bonner Co., Idaho. Thos. Golden, pres. and gen. mgr.; Wm. K. Glenn, sec.-treas. Lands, 3 claims, showing a 20' iron gossan carrying considerable hematite and magnetite, assaying \$2.50 per ton in copper, gold and silver. Development by a tunnel, planned to be driven 300', to give a back of 150'. Property has river and rail transportation to the Panhandle smelter.

NORTHWEST SMELTING & REFINING CO.

OREGON

Idle. Letters to 786 Broad St., Newark, N. J., and Sumpter, Baker Co., Ore., unanswered. Scott German, pres.; G. N. Whittle, sec.; F. W. Scofield, gen. mgr. Organized Jan. 26, 1910, under laws of New Jersey, capitalization \$700,000, shares \$10 par, nonassessable, in \$350,000 preferred and \$350,000 common stock; issued, \$400,000. Is operated as a close corporation.

Owens the Sumpter smelter, built by the Oregon Smelting & Refining Co., bought, under execution, Dec., 1909, for \$17,050. The company also owns 40 acres of mining claims, a limestone quarry, 640 acres of timber land, and the 200-acre smelter site.

The reduction plant includes a 33x37" sampling mill with 16x86' ore bins. The smelter, of 150 tons rated daily capacity, has a 38x144" Allis-Chalmers power-jacket blast furnace and a 100-ton Chisholm, Boyd & White briquetting press. The power house has a 16x36" Corliss engine with belt-driven blower and a 2-unit generator plant, supplying current for pumps and light.

NORTHWESTERN GOLD & COPPER CO.

OREGON

Idle. Office: City Bank Bldg., Wheeling, W. Va. Mine office: Susanville, Grant Co., Ore. C. A. McFadden, Jr., pres.; C. A. Kalbitzer, vice-pres.; Thos. W. Norton, sec.-treas.; John F. Slinger, gen. mgr.; preceding officers, G. L. Giesey, August Trabert, A. P. Brinkmier, Alexander Ogle, Sr., and Wm. Broadwing, directors. Organized May 3, 1907, under laws of Oregon, capitalization \$1,000,000, shares \$1 par, nonassessable; issued, \$670,785. Annual meeting, second Monday in January. Lands, 3 claims, known as the Chattanooga mine, developed by shafts of 100', 210' and 90', with 533' of drifting, estimated by management to show 25,000 tons of ore. Property is reported to have an 18" vein of high-grade galena. Equipment includes a 60-h. p. plant, with hoist good for 500'. Management plans continuing work, 1913.

NORTHWESTERN METALS CO.

MONTANA

Eastern office: 1016 Real Estate Trust Bldg., Philadelphia, Pa. Reduction plant at Helena, Mont. Marcus L. Hewitt, pres.; R. G. LeConte, vice-pres.; C. M. Markoe, sec.-treas.; preceding officers, Chas. W. Prescott, Erie, Pa., Burrows Sloan, Archibald G. Thompson, Felton Bent and Arthur B. Huey of Philadelphia and John H. Henry and C. C. Titus of Helena, Mont., directors; C. C. Titus, mgr. Organized Sept. 8, 1909, under laws of Montana, capitalization \$3,000,000, shares \$10 par, nonassessable.

Company owns a two-thirds interest in the Bullion mine, with 6 claims, carrying copper ore, also 150 acres of placer ground, with water rights on Jack mountain, 10 miles from Basin, in Jefferson county, Mont.

The mine shows a vein in quartz monzonite cut by tourmaline bearing aplite. The vein has clay walls, is very wet and carries bunches of ore.

The ore is a mixture of pyrite, tetrahedrite, galena, zinc-blende, chalcopyrite and arsenopyrite in a gangue of white quartz. Development includes a 300' shaft and several thousand feet of level and tunnel work. Improve-

ments at the Bullion mine include a boarding house, bunkhouse, warehouse, smithy, office, laboratory and stables. The Bullion also has a 125-ton concentrator.

The smelter plant, located on the site of the old Peck concentrator, midway between Helena and East Helena, includes 3 stone buildings. The company controls the patent rights for the northwestern states, of the Baker-Burwell method of treating zinc ores, and after 3 years' experimental work is building a commercial plant expected to be in operation in Sept., 1913. This plant and previous work are said to have cost a total of \$275,000. Is a very speculative venture.

NORTHWESTERN MINING CO.

IDAHO

Idle. Prof. W. B. Clark, Johns Hopkins University, Baltimore, Md., pres. Mine near Lucile, Idaho Co., Idaho. Francis T. Homer, vice-pres.; Chas. G. Helm, sec.-treas. Organized May, 1905, under laws of New Jersey, capitalization \$200,000, shares \$1 par. Is a close corporation, temporarily not operating.

Property is the Blue Jacket mine, with 4 full and 6 other claims nearby, on west slope of mountains, between Salmon and Snake rivers, about 8 miles west of Lucile, Idaho. Claims show diabase, diorite and altered schist with a vein having an ore shoot estimated at 40 to 70' width, carrying oxidized ores followed by chalcocite and chalcopyrite, estimated to average 4 to 5% copper, 5.5 to 7 oz. silver and \$2.80 to \$4 gold per ton. Development is by shafts of 100' and 650' and an 868' tunnel, with 4,100' of workings, estimated by the management to show 60,000 tons of ore, with 25,000 tons blocked out for stoping. Equipment includes gasoline power. Is valuable if railway transportation were given.

NORTON; A. O.

QUEBEC

Office: 286 Congress St., Boston, Mass. Mine office: Suffield, Sherbrooke Co., Quebec. A. O. Norton, owner and mgr.; W. Jenkin, mine supt. Lands, 600 acres, freehold, except 150 acres, title to which covers only mining rights. Property includes the Suffield, King, Silver Star and Marrington mines, in Ascot township, 7 miles from Sherbrooke, with railroads within 2 miles on either side.

The property shows 3 lenses, of 3 to 20' width, 1 proven to depth of 400', estimated by owner to average 4 to 5% copper, from a trace to 10% zinc, 5 to 25 oz. silver, and \$1.50 gold per ton. The King mine, reopened 1900, has a 165' incline shaft with about 500' of workings. The Suffield mine, reopened 1906, has a 245' shaft with about 1,200' of workings, showing ore with an average of about 4%, and combined gold and silver values of \$2 to \$12 per ton, with about 25% sulphur. The Marrington mine, 100 acres, 1½ miles from the Suffield, and about 1 mile from Capelton, is opened by a 260' shaft with about 400' of drifts, developing a lens about 75' wide at surface, carrying at depth 5 to 7' of good ore. Steadily developing in 1912-13, with small force, but not yet shipping.

Equipment includes a steam plant, 100-h. p. boiler, a 25-h. p. double cylinder steam hoist and a straight-line air compressor. Property considered promising.

NOTRE DAME COPPER CO.

NEWFOUNDLAND

Mine office: Twillingate, Newfoundland. Merged, 1912, with the Great Northern Copper Co.

NUMBER ONE MINING CO.

WASHINGTON

Idle. Mine office: Nighthawk, Okanogan Co., Wash. A. B. Lee, manager, at last accounts. Mine is said to have a 33' vein carrying a 9' pay-streak of ore of concentrating grade, containing lead and copper values,

developed by tunnel and shaft. Company presumably bankrupt and property closed down indefinitely.

OAK CONSOLIDATED MINING & MILLING CO.

OREGON

Idle. Mine near Grants Pass, Josephine Co., Ore. Chas. W. Birum, manager, at last report. Property includes the Oak and Hidden Fortune mines, carrying gold-copper ores, in Josephine and Jackson counties, Oregon. Has gasoline engine and an air compressor.

OAK SPRINGS COPPER CO.

NEVADA

Caliente, Nye Co., Nev., nearest railway point. E. B. K. Ferguson, pres., Provo, Utah; B. H. Brown, vice-pres.; A. B. Rockhill, Salt Lake City, sec. Organized May 20, 1911, under laws of Utah, capitalization \$50,000, shares 5 cts. par. Owns claims in Oak Springs district, Nye county, known as Washoe No. 1 to No. 7 inclusive. The district is 80 miles S. W. of Caliente on the Salt Lake railroad and shows veins in limestone cut by granite.

OAKESDALE COPPER CO.

MONTANA

Idle. Mine near Java, Dawson Co., Mont. R. H. Hutchinson, pres. and gen. mgr. Organized Aug., 1907, under laws of Washington, capitalization \$100,000, shares 10 cts. par, nonassessable; issued, about \$80,000.

Lands, 19 claims, unpatented, in the unorganized Java district. Property shows quartzite and limestone, having an orebody reported by company to carry 12% copper, 7 to 8 oz. silver and \$6 gold per ton, developed by tunnels of 106', 475' and 560'. Equipment includes a 25-h. p. gasoline engine, and there are 7 buildings. No report received and company understood to be dormant.

OAKLAND COPPER BELL MINE.

NEVADA

At Yerington, Lyon Co., Nev. Owns group of claims in the Pumpkin Hollow section of Yerington district, developed by a 40' shaft showing 3' of ore, carrying 7% copper with 5 oz. silver and \$2 gold. Was making small shipments in summer of 1913.

OAKS CO.

NEW MEXICO

Address: Alma, Socorro Co., N. M., about 80 miles by daily stage from Silver City, the nearest railway point. W. J. Weatherby, pres.; H. A. Hoover, sec. Owns the Johnson group with 500 acres in the Cooney, or Mogollon district, showing the Fanny, Johnson, Trilby and other veins, now being developed. Company's principal work is the driving of a long cross-cut tunnel to be 9,000' long and intended as a main drainage and haulage tunnel for the district. This tunnel will intersect 2 veins said to be now producing at the rate of \$1,750,000 per year. The company is steadily developing its mines and shipping ore. It has leased part of its ground at tunnels, A, B and C.

The district is described in Mines of Mexico, U. S. Geol. Survey, Prof. Paper, 68, p. 191.

OASIS MINING & DEVELOPMENT CO.

UTAH

Idle. Office: Coalville, Utah. Mine office: Erekson, Tooele Co., Utah. Frank Evans, pres.; J. N. Dunn, vice-pres.; W. G. Fisher, sec.-treas. Organized Aug. 1, 1906, under laws of Utah, capitalization \$55,000, shares 10 cts. par, assessable, with assessments limited to 3%. Lands, 12 claims, unpatented, 42 miles from a railroad, having shallow shafts and short tunnels aggregating about 350' of openings, showing lead and copper ores.

OAXACA CONSOLIDATED COPPER CO.

MEXICO

Office and mine: Ap. 49, Oaxaca, Oaxaca, Mex. C. C. Lastinger, manager, at last accounts. Property includes the Magistral and Predilecta mines, near Oaxaca, carrying copper ores. Has water power. Shut down and presumably dead.

OAXACA MINING, MILLING & INVESTMENT CO. MEXICO

Mine near Ixtlan de Juarez, Ixtlan, Oaxaca, Mex. C. Arthur, mgr.; Robert McCormick, supt., at last accounts. Property includes La Esperanza mine, having auriferous and argentiferous lead, copper and zinc sulphides, with water power and 10-stamp mill. Probably closed down owing to Mexican disturbances.

OCEAN MINING CO. UTAH

Idle. Office: Salt Lake City, Utah. Mine address: Ibapah, Tooele Co., Utah. R. A. Kimball, pres.; Robert Palmer, vice-pres.; Brigham Clegg, sec.; C. C. Crapo, treas.; O. A. Smith, Sandy, Utah, supt., at last report, Organized 1907, under laws of Utah, capitalization \$60,000, shares 10 cts. par, assessable. Lands, 10 claims, unpatented, in Dugway district, 60 miles from a railroad, with a very rugged and arid country intervening. Property shown bedded veins carrying mainly copper, with some silver-lead, opened by shafts of 200' and 300'. Made a test shipment returning 23% copper. Property is being developed by a crosscut tunnel in limestone and quartzite, on Ocean claim.

OCTO MINING CO. NEW MEXICO

Office: 112 East State St., Redlands, Cal. Mine at Lordsburg, Grant Co., N. M. N. W. Hale, pres.; G. S. Turrill, vice-pres., and sec.; C. S. McWhorter, treas.; A. G. Hubbard, F. L. Winsor and C. C. Reasoner, directors; E. K. Davis, gen. mgr.; Chas. Pickenbeck, mine supt. Organized Nov. 15, 1912, under laws of California, capitalization \$500,000, shares \$1 par; issued, 300,000. Annual meeting, third Thursday in December.

Property developed by two 3-compartment shafts, about 175' deep, showing a deposit of ore said to average 15% copper. Equipment includes 2 small hoists, air compressor and 50-h. p. boilers. Company reported to be spending about \$1,000 a month for development work in 1913.

OEST; ALFREDO. MEXICO

Idle. Office: Apartado 65, Oaxaca, Oaxaca, Mex. Alfredo Oest, owner and general manager. Formerly owned by Oest & Enriquez. Lands, 363 hectares, well watered and timbered, 23 leagues from Acatlan, Puebla, including El Alfrez, La Morena, La Soledad and El Fresno mines.

La Soledad mine near Flapancingo, district of Silacayoapam, Oaxaca, is still idle. This mine carries copper ores which the owner intends to utilize in combination with the lead ore from the El Alfrez and La Vega mines in the same neighborhood, and as a flux for the silicious silver ores from his Realito group of mines at the old Spanish mining camp of El Realito, near the town of Silacayoapam.

OHIO & COLORADO SMELTING & REFINING CO. COLORADO

Office: A. C. Foster Bldg., Denver, Colo. Works: Salida, Chaffee Co., Colo. J. C. Kortz, pres.; B. Hochschild, vice-pres.; Max Schott, secretary and gen. mgr.; C. M. Loeb, treas.; F. D. Weeks, supt. Capitalization \$3,000,000. Is controlled, through stock ownership, by American Metal Co., Ltd. Company owns no mines, but owns and operates the Salida smelter of 1,000 tons rated daily capacity, doing a general custom business. The plant has a 150-ton sintering plant, a sampling mill, 3 furnaces and handles mainly silver-lead ores, the only copper treated being that bought with lead ores, which is concentrated to about 40% tenor and sold.

OHIO COPPER CO. UTAH

Liquidated and properties and assets transferred to the Ohio Copper Mining Co. Organized Nov. 1, 1903, under laws of Nebraska, capitalization \$1,000,000, and reorganized Aug. 8, 1907, under laws of Maine, capitalization \$10,000,000, increased Feb., 1908, to \$15,000,000, shares \$10 par; issued, \$12,292,700. Has authorized \$2,000,000 ten-year 6% gold bonds, convertible

into stock at par, at any time prior to Sept. 1, 1917; outstanding, \$1,326,000. Borrowed \$600,000 on notes, April, 1910, reduced, April, 1911, to \$500,000. Company planned a sinking fund, calling for \$100,000, beginning Sept. 1, 1910, but date for beginning the sinking fund was postponed and has not been heard of since. Company was formerly controlled, through ownership of about two-thirds of issued stock, by F. Augustus Heinze and the United Copper Co. The company having a floating debt of \$850,000 in June, 1912, with its unsold bonds given as collateral security, was reorganized as the Ohio Copper Mining Co., each share of the old company being exchangeable for 1 in the new on payment of \$1, the new shares being marked \$3 paid. In lieu of this, stockholders were offered a final liquidation dividend of 25 cts. per share. Balance sheet dated March 31, 1912, showed cash and accounts receivable, \$120,042; mill buildings, supplies, etc., \$1,508,848; mine development, \$681,329 and mining properties at par value of securities issued therefor, \$12,543,794. Liabilities include \$12,608,700 capital stock; \$1,246,000 first mortgage bonds outstanding; accounts payable, \$839,489 and surplus, \$159,826. Gross receipts, Oct. 31, 1911 to March 31, 1912 were \$434,903 and profit on operations, \$184,346, less fixed charges of \$74,869, leaving net profit of \$109,476.

Production for 6 months ending March 31, 1912, was 311,067 tons averaging 1.176% copper, yielding 9,219 tons concentrates of 22.2% copper, returning 3,754,866 lbs. copper. Costs per ton of ore are given as 26.7 cts. for mining, 16.03 cts. for transportation and 37.02 cts. for milling, a total of 79.78 cts. equal to 6.61 cts. per lb., which of course does not represent the real cost of the copper as sold, which was nearer 12 cts.

Company has been a most unfortunate investment to its stockholders from the start. The public has been misled throughout the entire life of the company, by unwarranted and highly-colored statements of the mining development, ore reserves, average values, mill recoveries and profit from operations. The new company is under the same control and management at date of writing.

OHIO COPPER MINING CO.

UTAH

Office: 74 Broadway, New York City. Operating office: Salt Lake City, Utah. Mine and works office: Lark, Salt Lake Co., Utah. W. O. Allison, pres.; M. Levy, treas.; F. Augustus Heinze, J. W. McKinnon, J. W. Pierson, Jr., W. C. Lewis and Walter I. Badger, directors; Chas. W. Saacke, sec.; Frederick Eckstein, asst. sec.; Alfred Frank, gen. mgr.; S. A. Dedrick, mill supt.

Organized July 8, 1912, under laws of Maine, capitalization \$8,000,000, shares \$5 par, \$3 paid; issued, 1,300,000. Funded debt \$2,000,000, first mortgage convertible 6% bonds; \$1,246,000 outstanding, due Sept. 1, 1917, interest payable March and Sept. 1, with proviso for \$120,000 sinking fund each year, met July, 1913, by the novel, questionable, but apparently only available method, of cancellation of that amount of treasury bonds. J. L. Williams, 74 Broadway, New York city, and David Fullam, Boston, transfer agents; Empire Trust Co., New York and International Trust, Boston, registrars. Annual meeting, first Wednesday in June at Portland, Me.

Balance sheet as of May 31, 1913, shows: Assets—mine and mill properties, \$4,745,789; treasury stock, \$250,000; furniture and fixtures, \$2,335; unexpired fire insurance, \$792; mill and mine supplies, \$65,090; cash, \$192,403; accounts receivable, \$278,603; total, \$5,535,014. Liabilities—capital stock, \$4,150,000; bonds, \$1,246,000; accounts payable, \$130,632; profit and loss surplus, \$8,381; total, \$5,535,014. No income account is presented but it appears from the 1913 balance sheet that a profit of \$93,177 resulted in the period from Aug. 1, 1912, up to May 31, 1913, or \$9,317 per month. Other

expenses consumed \$22,495, and bond interest \$62,300 more, leaving a net profit for the 10 months period of \$8,382. Current assets, consisting of \$192,404 cash and \$278,604 accounts receivable, compared with current liabilities of \$130,632.

Lands, 14 claims, patented, 120 acres, bounded on the north and west by holdings of the Utah Copper Co., on the east by the Fortuna Mining & Milling Co., on the south by United States Mining Co., and on the S. W. by the Boston Consolidated. The Mascotte tunnel, said to be controlled by Mr. F. Augustus Heinze, through the Bingham Central railway, exacts a toll of 15 cts. per ton on all ore extracted through that avenue, yielding a very considerable revenue to the owners. The mineral property was bought by the old company from the Columbia Copper Mining Co., for \$245,000.

Property carries some ore in veins along a mineralized zone with an E.-W. strike and dip of 45° N., consisting of a belt of quartzite of 500' width carrying 2 parallel veins, known as the What Cheer and All's Well. These veins are more than 500' apart, and separated by mineralized quartzite which constitutes the main orebody of the property, that carries ore said to average 1.6 to 1.8% copper, but actually averaging 1.015% copper. The quartzite, which adjoins the laccolithic mass of monzonite-porphry of the neighboring Utah Copper and Boston Consolidated properties, is much shattered and broken, with ore disseminations and impregnations along shatter and cleavage planes, in the brecciated material, ore being chiefly chalcocite and chalcopyrite, associated with pyrite, readily amenable to concentration, and lying above the level of the Mascotte tunnel.

The mine is developed by tunnels, and a shaft, with other shallow shafts of no importance. The main shaft, 6x12', is sunk at an angle of 45°, to depth of 1,100', where it connects with the Mascotte tunnel. The 800' Main crosscut tunnel intercepts the What Cheer and All's Well veins, the former being said to show 11' of rich sulphide ore, and the latter said to show a 6' vein assaying up to 5% copper, with small gold values. A seam of rich ore, cut in the Elvina vein, on the 500' level, shows a shoot of about 4' width, averaging 4% copper and \$1.80 gold per ton, with excess of iron.

Estimates of ore developed vary greatly, the former management claiming that ore had been developed under about 5 acres, the porphyritic orebody being estimated as 400' wide, 1,000' long and 600' deep. A 1910 estimate gave 3,746,165 tons of ore developed with 9,738,690 tons of probable ore and the average tenor probably about that of the ore milled, or 1.01% copper.

The 14,000' Mascotte tunnel, connecting with the shaft at depth of 1,100', cares for the large volume of water coming from the workings. Ore is blocked out in 100' squares, with extensive development on the 3rd, 5th and 7th levels, and the caving system is used in extraction. Ore is sent from the upper workings, through chutes, to a 4,000-ton ore-bin, 20' wide and 200' long, extending over both tracks, loaded in about 4 minutes from the bins into trains of 18 to 20 five-ton double-bottom steel cars, and hauled, by electric locomotives to the concentrator at Lark, a distance of 3,200'. The tunnel has double tracks.

Electric power is used exclusively, commercial current being taken from the Telluride Power Co., over long transmission lines, 1 of 170 miles length, at 40,000 volts, stepped down to 440 volts for use at the mine, mill and pumping plant. Equipment includes an electric hoist and 3 air compressors.

The mill, at Lark, 3,200' from the mouth of the Mascotte tunnel, is 317' long and 391' deep, in 4 units, built in 6 terraces. The frame is of steel, covered with heavy corrugated iron sheathing, lined with building paper,

over which there is a lining of asbestos, the lining being held in place by poultry netting. Floors are of concrete and the building is heated by hot water. Ore trains enter the mill over a 50' steel trestle above the bins. The structure was built, 1907, by the Minneapolis Steel Co., at a cost of \$200,000, for buildings alone. Three of the 4 units were in commission at the beginning of 1913, handling 2,500 tons, daily. The unusual feature of this mill is the absence of water classification, the only hydraulic classification being by the jigs, and concentration is entirely by jigs and tables, with a few buddles that treat the very finest feed, there being no vanners. Equipment of the 2 units in full commission includes 2 coarse and 4 fine Blake crushers, elevators, trommels, conveyors, 4 roughing and 8 finishing rolls, of Allis-Chalmers make, 16 Monadnock Chilean mills, 144 jigs, 288 Wilfley and James tables, and Callow classifying tanks. The installation includes 51 motors, ranging from 15 to 150 h. p.

Three systems of milling have been tried since the mill went into operation. Originally the ore, coarsely broken by Blake crushers, was ground in Chilean mills. The Wall rolls were tried in 1912, only to be removed in order to obtain better results.

Mr. Atwater's report strongly criticizes the present flow sheet of the mill and the changes recommended will it is hoped raise the present extraction of 45%, or 9,135 lbs. of copper recovered per ton of ore milled, to 60%.

Production from Aug. 1, 1912, to Dec. 31, 1912, was 2,343,439 lbs. copper. The company was milling about 2,500 tons of ore daily, Oct., 1913. Mining costs averaged about 25 cts. per ton, transportation 15 cts. per ton, with milling costs reported as 45 cts. per ton, and total mining and milling costs were said to be about 85 cts. per ton in 1913, compared with 84 cts. in 1911. The ratio of concentration is very high, being about 33 into 1, with a consequent heavy loss in tailings, of probably 55%, or upwards. The ore was running about 1.015% copper in 1913. Concentrates are sent to the Garfield smelter, 27 miles, at a freight rate of less than \$1 per ton. Operating profits were about \$20,000 a month in the autumn of 1913. It is obvious that the average grade of the porphyry ores of the Ohio is exceedingly low, even dangerously so, but the mine is well developed, with very large bodies of ore that can be mined and milled at low average cost.

OHIO KEATING GOLD MINING CO.

MONTANA

Office: B. M. Calkins, president, Butte, Mont. Mine at Radersburg, Broadwater Co., Mont. Capitalization \$800,000, increased Dec., 1910, from \$500,000. Controlled through stock ownership by Radersburg Consolidated Mining Co. Is a promising, though small gold mine producing some copper from pyritic ores found as shoots in strong fissure veins in igneous rocks.

OHIO LEAD MINING & SMELTING CO.

NEVADA

Probably idle. Mine near Wells, Elko Co., Nev. Property, 8 claims, 160 acres, showing 7 fissure veins, said to give average assay values of 7% copper and 7 oz. silver per ton, also a silver-lead vein opened by a 400' shaft and tunnels of 700' and 900', with 3,000' of workings. Has a 50-ton concentrator and a smelter with 3 small water-jacket blast-furnaces. No returns secured.

OHIO-MEXICAN MINING CO.

MEXICO

Letters to 1703 First National Bank Bldg., Cincinnati, Ohio, unanswered. Mine near Caborca, Altar, Sonora, Mex. J. H. McKibben, pres.; John Henderson, vice-pres. and gen. mgr.; W. K. McKibben, sec.-treas.; preceding officers directors; I. R. Henderson, mine supt., at last accounts. Or-

ganized Aug., 1904, under laws of Arizona, capitalization \$3,000,000, shares \$10 par.

Lands, 47 acres, with mill site and 6,500 acres of ranch lands, show limestone and granite, with porphyry intrusions. Claims show several orebodies, of which 3, partly developed, have estimated average widths of 16', 20' and 40', and are opened by 5 shafts and a tunnel of 380'. Mine workings are optimistically reported to show 30,000 to 60,000 tons of ore, with 20,000 tons blocked out for stoping, averaging 9.3% copper, 4 to 10 oz. silver and \$2. to \$5 gold per ton, from carbonate ores and chalcocite. Property has a 125-h. p. steam plant at the mine, and a 100-h. p. steam plant at smelter. Equipment includes 3 hoists, good for 400 to 600' depth, a 2-drill Rand air compressor, and 15 shops and mine buildings.

The smelter, at La Calera, receiving ore by wagon from the mine, has a 60-ton water-jacket blast furnace, turning out black copper of 90 to 95% tenor, which included gold and silver values, shipped to the Nichols Copper Co. for electrolytic refining.

OHIO MINES CO.

ARIZONA

Office: 314 Outlook Bldg., Columbus, Ohio. Mine office: Chaparal, Yavapai Co., Ariz. H. W. Whitaker, pres.; T. D. Brown, vice-pres.; J. F. Rogers, sec.-treas.; preceding officers, R. S. Barbee, J. M. Rittenour, Jacob Sebastian, Thos. M. Murphy, E. C. Paine and J. S. Jones, directors. Organized Jan., 1909, under laws of Arizona, capitalization \$2,500,000, shares \$1 par, in \$200,000 preferred and \$2,300,000 common stock; issued 1,482,908 shares; \$40,760 first 7% mortgage notes, \$38,160 issued. Annual meeting, third Monday in January.

Lands, 14 claims, partly patented, 420 acres, with a 5-acre mill site, and water-rights on the Agua Fria river, 6 miles from the mine, in the Big Bug district. Property was bought of the Jessie Mines Co., whose promoters managed to escape jail. Development is by 3 shafts, 659', 206' and 200' deep, with 7,000' of workings, and the mine is said to have produced upwards of \$750,000 in gold, under an ownership previous to that of the Jessie Mines Co. Management plans extensive operations for 1913, and the installation of an electrical power plant.

OHIO & TENNESSEE MINING CO.

ARIZONA

Probably dead. W. D. Clymer of Delaware, Ohio, pres. and supt., at last accounts. Mine, 10 miles south of Wickenburg, Maricopa Co., Ariz., has a 115' shaft, showing a 2' vein.

OHIO-YAQUI MINING CO.

MEXICO

Idle. Office: Columbus, Ohio. Mine office: San Javier, Hermosillo, Sonora, Mex. John J. Joyce, pres. and mgr.; Lovett W. Jones, vice-pres.; John J. Joyce, Jr., sec. and asst. mgr.; Wm. M. Maize, treas.; Jas. S. Lawrence, supt., at last report.

Owns La Sierra mine, an old Spanish mine, carrying argentiferous copper ore, with excess of iron. Development is by a 1,400' tunnel, cutting a 2' vein carrying ore assaying up to 2% copper and 75 oz. silver per ton, and an ore zone of 150' estimated width is said to give assays of 2.5% copper and 50 oz. silver per ton, presumably from selected ores. The mine is said to have considerable ore blocked out for stoping in the upper workings.

Equipment includes a steam plant with an 80-h. p. boiler and hoist, and there is a 10-stamp mill.

OJIBWAY MINING CO.

MICHIGAN

Office: 1400 Alworth Bldg., Duluth, Minn. Operating office: Houghton, Mich. Mine office: Ojibway, Keweenaw Co., Mich. Dr. Lucius L. Hubbard, pres.; Chas. A. Duncan, vice-pres. and treas.; preceding officers, Thos. F. Cole, Chester A. Congdon, Chas. d'Autremont, Jr., Oscar J. Lar-

son, Capt. Jas. Hoatson, Capt. Thos. Hoatson and John D. Ryan, directors; Frederic R. Kennedy, sec.; Daniel R. Smith, asst. sec.; Wm. G. Hegardt, asst. treas.; Henry B. Paull, auditor; Andre Formis, supt.

Organized June 8, 1907, under laws of Michigan, capitalization \$2,500,000, shares \$25 par, assessable; issued, \$2,100,000, \$15 paid. Levied a \$2 assessment Jan., 1910, payable \$1 March and \$1 Oct., 1910, and a \$1 assessment Dec. 10, 1912. Company began business with \$500,000 cash, and, on April 30, 1912, had cash and accounts receivable of \$84,747.58, with \$8,173.16 accounts payable. Property was bought for \$459,919.29. Boston Safe Deposit & Trust Co., registrar; American Trust Co., Boston, transfer agent. Shares are listed on the Boston Stock Exchange. Annual meeting, first Tuesday in June.

Lands, about 1,600 acres, bounded on the north by the Cliff and on the south by the Seneca. Property includes the old Manhattan tract, Bacon & Jacobs lands, bought of the Union Copper Land & Mining Co., and the Miskwabik tract of 1,224 acres, in Sec. 5, T. 57, and Secs. 32 and 33, T. 58 N., R. 31 W.

The Kearsarge bed was located, 1904, on the Miskwabik tract, about 4 miles N. E. of Mohawk No. 1 shaft, and was proven by 5 bore holes drilled across the formation at intervals of 1,200'. Four of these holes gave good cores, being especially rich well toward the northern limits of the tract. The drill holes showed the Kearsarge amygdaloidal bed to be divided into 7 alterations of amygdaloid and trap, immediately above the geological horizon of the Wolverine sandstone, the different cores each showing copper from either 1 or more of 4 horizons. Drilling indicates that copper values alternate from bed to bed, or layer to layer, if the cupriferous zone of the Ojibway be considered a single strata, only 2 of the amygdaloidal layers being well mineralized in a given cross-section, as a rule.

Development, begun in July, 1907, consists of 2 shafts, 1,116' apart, both sunk in the footwall, which shows some heavy copper. Shafts are duplicates, each 8x20' in size, with 3 compartments. The shafts can be sunk to a depth of 8,000' on the company's lands. They have concrete collars and roadbeds, and are connected by a drift on the 800' level. The 1st level is at depth of 350' from surface, with others below, 150' apart in the upper part of the mine, and 100' apart from the 1,500 to 2,000' levels. No. 1 shaft is sunk at an angle of 33° in the footwall of the lode, but since the lode flattens 5 to 8° below a bar of barren ground, the shaft passes through it into the footwall at depth.

No. 1, or north shaft, 1,500' from the northern boundary of the property, was 2,051' deep in 1913, disclosing copper ground from grass roots, making a much better showing in this respect than No. 2 shaft, due, however, to its being sunk so near the copper-bearing bed. Developments in this shaft show that the Kearsarge stratum is split in two, having distinct beds of 20' and 13' respectively, separated by 13 to 15' of trap. The 1,600' and 1,700' levels show good ore.

No. 2 shaft, 1,116' S. W. of No. 1, is sunk about 90' in the footwall, and was 1,954' deep Aug., 1913, disclosing very little copper ground above 800', though a material betterment is noted below that depth, and a very marked improvement is noted below 1,500' depth. This shaft is sunk in unusually firm ground, requiring very little timbering. Work was suspended early 1913, for lack of working capital, and generally discouraging results shown in development.

The power plant has duplicate Nordberg duplex-cylinder hoists, cables passing to each shaft. These hoists raise 2½-ton skips, and are good for 2,000' depth each. A 7-drill 2-stage air compressor, driven by a

100-kw. generator is belt-connected to a 140-h. p. Russell high-speed engine. Buildings use the Webster reheating system, charged by exhaust from the air compressor, which also heats water for boiler feed. The plant has 150-h. p. Burt locomotive-firebox boilers, and a 100-h. p. condenser. The shops have individual motors, and the mine has an electric pump, with a capacity of 85 gal. per minute, working against a 500' head.

Mine has carpenter shop, smithy and machine shop, each 24x48' in size, a warehouse with an office connected, bunk house, and 24 dwellings for employees, at a town site about one-half mile from the mine. The town site and mine have a complete water system, with hydrants and ample fire protection. The Keweenaw Central railway has a spur to the mine.

The mine is thoroughly equipped for development to a depth of 2,000', but has spent the bulk of its money underground, the management having done much work for the comparatively short time and small amount of money expended. Development has been systematic, the management having planned making a mine upon 5-drill cores, too few a number to be sure of results, and which, as later development has proven, gave rather too favorable an idea of the richness of the lode, though developments have shown much to the contrary.

OJO VERDE COPPER CO.

MEXICO

Idle. Letter unclaimed at Autlan, Jalisco, Mex. Thos. Kelly, pres.; Stanislaus F. Ossolinski, mgr., at last accounts. Lands include El Refugio mine near Autlan, showing a strong vein outcrop for nearly a mile. Property is said to have an extensive orebody, carrying mainly copper values. The management planned building a wagon road to Chamela, on the Pacific, and erecting a mill. Shut down and presumably out of business.

O. K. EXTENSION MINING & REDUCTION CO.

UTAH

Idle. Office: 222 D. F. Walker Bldg., Salt Lake City, Utah. Mine office: Milford, Beaver Co., Utah. A. J. McMullen, pres. and gen. mgr.; T. M. Farrell, vice-pres.; Chas. A. Weaver, sec.-treas.; preceding officers, R. H. Greenhalgh and H. T. Harrison, directors; D. P. Rohlfing, mg. engr. Organized Nov., 1899, under laws of Utah, capitalization \$150,000, shares 50 cts. par, assessable; issued 159,859; total assessments to date, \$15,363. Annual meeting, second Tuesday in October.

Lands, 6 claims, 3 patented, 120 acres, near the Majestic mine, in the Beaver Lake district, show monzonite and quartz-porphyry, carrying 2 fissure veins, of 5 to 24' estimated average width, traceable 150'. Opened by 7 pits and shafts of 15 to 510' depth, and a 150' tunnel, with 1,045' of workings, showing chalcopryite estimated to average 2% copper. Inactive except for annual assessment work.

O. K. OLSEN COPPER MINE.

IDAHO

Address: Troy, Latah Co., Idaho. Property, situated east of Troy, shows disseminated copper-bearing sulphides in gneiss and schist in which a 60' shaft has been sunk, following a band of enriched ore carrying gold and silver values. The district surrounding this property is covered by the Columbia basalt flow and the copper-bearing rocks show only in the water courses, but form a belt over a mile long and half mile wide in which contact rocks with bornite and other sulphides are exposed. So-called "porphyry ore" probably also occurs beneath a leached capping in this vicinity.

OKLAHOMA COPPER CO.

ARIZONA

Mine near Florence, Pinal Co., Ariz. Company is apparently bankrupt and property in hands of H. G. Beard, manager, who paid former judgment and expected to transfer it to a new organization at last accounts.

OLALLA COPPER MINING & SMELTING CO. BRITISH COLUMBIA

Office: Second National Bank Bldg., Paterson, N. J. Mine office: Olalla,

Yale district, B. C. Robt. Gaede, pres.; Jos. Bamford, Jr., vice-pres.; John E. Tylee, sec.-treas.; preceding officers, Frank A. Blauvelt, Warren N. Conant, Robt. Swinley, H. Chas. Royce and Frank E. Morrison, directors. Organized Oct. 19, 1901, under laws of Maine, capitalization \$8,000,000, shares \$25 par. Annual meeting, first Monday in August.

Lands, 32 claims, crown-granted, 1,183 acres, and a 92-acre mill, smelter and the Olalla town site, in the lower Similkameen and Keremeos camps, Osoyoos division, Yale district, 4 miles from a railway. Lands said to show contact deposits between diorite and felsite, with orebodies in both, but mainly in the felsite. Twelve claims adjoin the town site of Olalla, and the Dividend group, of 7 claims, is 17 miles distant. Veins, about a dozen in number, 1 vein, under development, claimed by management, to carry bunchy replacement deposits of chalcopyrite, with garnetite and magnetite gangue, in limestone, near intrusive contacts, assaying 1.5 to 5% copper, a little silver and \$1 to \$7 gold per ton. Development is by a 70' shaft, and tunnels of 642', 600', 150' and 112', with 1,504' of workings. There is no power equipment. Property now idle, is leased, for 25 years, to the Yale Development & Construction Co., organized among the stockholders of this company.

OLD BALDY MINE.

ARIZONA

B. F. Daniels, owner, Nogales, Ariz. Property in Old Baldy district, 10 miles south of Helvetia and 45 miles south of Tucson, shows veins in pre-Cambrian granite and schist carrying high-grade chalcopyrite ore. Mine has 60' shaft from which crosscutting will be prosecuted in the autumn of 1913.

OLD COLONY COPPER CO.

MICHIGAN

Office: 70 State St., Boston, Mass. Mine office: Houghton, Mich. H. F. Fay, pres.; C. J. Morrissey, sec.-treas.; preceding officers, W. F. Fitzgerald, Irvin J. Sturgis, Rogers L. Barstow, F. L. Maguire, and John G. Stone, directors; Geo. S. Goodale, supt.; A. L. Dickerman, cons. engr.

Organized 1898, under laws of Michigan, capitalization \$2,500,000, shares \$25 par; \$12 paid in. Balance of assets Oct. 1, 1912, \$69,641. American Trust Co., Boston, transfer agent; Old Colony Trust Co., Boston, registrar. Stock listed on Boston Stock Exchange. Annual meeting, second Wednesday in December.

Lands, about 1,200 acres, in Sec. 17 and 18, T. 56 N., R. 32 W., adjoining the Calumet & Hecla on the west, and the Mayflower on the north.

A complete geological, cross-section was secured, 1899-1901, by a tunnel driven from the Eastern sandstone, 57° W. of N., for about 3,000', at right angles to the strike of the formation, N. 33° E., and by diamond-drill borings, from the Kearsarge amygdaloid eastward to the western end of the tunnel. This cross-section shows upwards of 75 amygdaloidal and conglomerate beds, a number of which carried a little copper in the drill cores, and were cut in the tunnel.

There are 5 shafts, deepest, 700', aggregating 2,200' in depth, with about 6,000' of drifts and crosscuts driven on various beds. A little shoot of copper was found in the crosscut west from No. 1 shaft, on the 700' level, the rock carrying calcite and epidote in considerable quantities, but results generally were indifferent, the various beds opened in this work proving both narrow and bunchy. Work was discontinued in 1909 and was resumed in 1911 by diamond drilling. This work, confined to the southeastern corner of the tract, was completed April, 1912, without securing important results, and was followed by work in the area immediately south of the Mayflower boundary line along which the Mayflower company had previously obtained rich showings of copper.

Six holes drilled to the end of 1912, definitely located the extension of the big amygdaloidal bed, originally disclosed by the Mayflower, and an equal number drilled to Nov. 1, 1913, proved its extension to a point fully 1,000' from the boundary line. The 12 drill borings average about 1,500' in depth and, as a whole, yielded exceptional showings of copper in a bed of unusual width and high degree of mineralization. Net results to date are decidedly promising.

OLD DOMINION CO.

ARIZONA

Office: 99 John St., New York. Mine office: Globe, Gila Co., Ariz. Jas. Douglas, pres.; Chas. Sumner Smith vice-pres.; Wm. M. Bradley, clerk; Chas. H. Altmiller, asst. clerk and treas.; preceding officers, Cleveland H. Dodge, Jas. McLean, Arthur C. James, Chas. S. Smith, and J. Waldo Smith, directors. Organized Jan. 15, 1904, under laws of Maine, capitalization \$8,750,000, shares \$25 par; 7,333,825 issued and fully paid. Annual meeting, last Wednesday in January. Stock listed on Boston Stock Exchange. First dividend, 50 cts. per share, was paid Dec. 15, 1905, and dividends have been as follows: 50 cts. in 1905; 50 cts. in 1906; \$1 in 1907; 50 cts. in 1908; \$1.50 in 1909; \$1.25 in 1910, a total of \$5.25 per share, to end of 1910; \$1.50 in 1911; \$4 in 1912; total, 19 dividends, to Dec. 31, 1912, \$3,213,536. Dividends for 1913 aggregate \$5 to Oct. 8.

The company is a securities-holding corporation only, organized to promote the operation of the mines of the Old Dominion Copper Mining & Smelting Co. and United Globe Mines. These two companies are operated individually, but with a free exchange, upon an equitable basis, of ores for smelting and fluxing. On Jan. 1, 1913, the Old Dominion Co. owned \$3,883,825 out of \$4,050,000 stock issued by the Old Dominion Copper Mining & Smelting Co. and the entire stock, \$2,300,000, of the United Globe Mines. Income account shows net income for 1912 of \$1,187,347, and a surplus of \$169,081, compared with \$485,989 and \$162,069 in 1911.

OLD DOMINION COPPER MINING & SMELTING CO.

ARIZONA

Office: 50 Congress St., Boston, Mass. Mine and works office: Globe, Gila Co., Ariz. Chas. Sumner Smith, pres.; Chas. T. Lund, vice-pres.; Chas. H. Altmiller, sec.-treas.; J. T. Herrick, E. P. Ricker, W. F. Crane, and J. Waldo Smith, directors; G. H. Dowell, gen. supt.; I. H. Barkdall, supt.; L. O. Howard, smelter supt.; Dr. L. D. Ricketts, cons. engr. Organized July, 1895, under laws of New Jersey, capitalization \$5,000,000, shares \$25 par; issued, \$4,050,000. Is controlled, through ownership of 155,353 shares of the 162,000 shares of issued stock, by the Old Dominion Co. Resumed dividends July, 1907, after an intermission of 12 years and paid dividends of \$1.25 per share in 1907, \$1 in 1908, \$3 in 1909, \$2.75 in 1910, \$3 in 1911, \$4.50 in 1912, total to Dec. 31, 1912, (17 dividends) \$2,551,500. The company formerly had a large floating debt which was cared for by the Old Dominion Co. and the last of this debt, amounting to \$100,000, was paid Oct., 1908. For 4 years, ending 1907, improvements cost \$1,875,647. Annual meeting, first Wednesday in April. Gross earnings for 1912 were \$2,888,204; net profit, \$1,004,186. Surplus July 31, 1913, was \$4,535,778. A balance submitted to the court Sept., 1913, is as follows:

Assets:		Liabilities:	
Mines	\$3,384,305	Capital stock.....	\$4,050,000
Plant	3,044,305	Debts	758,861
Floating assets.....	2,916,028		

Total\$9,344,639

Total debt liability....\$4,808,861

The surplus account consists of: Reserve against "special" fund voted for dividend, \$1,956,483; reserve for plant renewals, (neither asset or lia-

bility) \$759,344; mine renewals, \$867,074; profit and loss, \$952,876; total surplus, \$4,535,778.

The company was engaged for years in litigation with A. S. Bigelow and the estate of Leonard Lewisohn, suing for recovery of secret promotion profits. This has been settled by a judgment for \$2,223,722 against A. S. Bigelow rendered by the Supreme Court, and cash and securities to the value of \$1,900,000 are held for distribution as soon as a decision is given as to whether this money goes to the company treasury or is to be distributed to the holders of trust certificates. The suit for \$900,000 on the same grounds against the Leonard Lewisohn estate was adversely decided in the lower court, but is on appeal in the U. S. Supreme Court.

The company owns the Old Dominion mine having 9 claims, 3 fractional, and a 10-acre mill site, at Globe; the Old Dominion and Keystone claims, $3\frac{1}{2}$ miles north of Globe and the Continental mine at the head of Webster gulch, about 18 miles west of Globe; also the Chicago & New York group of 60 acres and the Geneva mine.

At the Old Dominion mine, the principal ore zone occurs along a big fault vein having a N.-E. strike with sharp easterly dip. The hanging wall is limestone and quartzite, with footwall of diabase of more recent age, faulting evidently occurring both before and after the intrusion of the diabase. The ore favors the hanging wall, but also occurs in lenses along the bedding planes of the limestone and in shattered quartzite, the largest lens yet developed being 60x100x200' in size. The oxidized ores are mainly cuprite, associated with a little malachite and chrysocolla, in a gangue of iron oxides and quartz.

Sulphide ores first appear at a depth of about 350', as chalcocite, with gangue of pyrite and quartz, the lower workings also showing chalcopyrite. All ores are more or less argentiferous, and, as a rule, are highly silicious, requiring heavy lime and iron fluxes in smelting. The mine shows large sulphide ore shoots on the 14th level and below, and has improved wonderfully in the deeper workings opened up in the past 3 years.

The orebody under Pinal creek shows oxidized ores up to 20% in copper tenor, on the 8th, 9th and 10th levels, with chalcocite of even better tenor on the 11th level.

The mine was handicapped for years by a lack of sulphide ores, which were bought from adjoining mines in the Globe district, and also from California and Mexico, but both the O. D. and United Globe have now developed an adequate supply of sulphide ore. Principal mining developments of the past few years have been at the western end of the mine.

Development in 1912 comprised 10,964' of drifting, 4,092' of raises, 203' sinking, a total of 15,259', as compared with 10,477' in 1911 and 18,468' in 1910. Mining costs were \$4.55 per ton in 1912. Production for year was 166,870 dry tons of ore, yielding 27,353,243 lbs. fine copper.

Mine is now developed down to the 1,600' level, where the workings show a wider orebody both east and west than was found on the 1,400', with no sign of diminishing values or size below the bottom workings of the mine.

No important changes have been made in mining methods and the heavy wet ground on the west side is still worked by square sets and filling, while the more solid ground on the east side of the mine is stoped by cut and fill without timber.

The mine is wet, but the excess of water, a sore grievance in the past, has become a source of revenue, water being sold to the city of Globe and to the Miami Copper Co. The maximum is 5,000,000 and the average is 3,500,000 gals. daily.

The mine is equipped with pumps of about 10,000,000 gals. capacity daily, these including a 1,500-gal. Prescott pump on the 10th level, having a 12" water column, discharging 30' above the collar of the shaft, into a launder on a trestle leading to a storage tank, whence water is drawn for use of the mill and smelter. There are 4 Nordberg steam pumps on the 12th level, having a rated capacity of 8,000,000 gals. per day, with 4 Gould electric pumps, 2 on the 10th and 2 on the 14th level.

Owing to the old shafts of the mine suffering severely from crushes and creeps, new shafts have been sunk in the footwall.

During 1912, 854,340,000 gals. of water was discharged through the drainage adit and 587,140,000 gals. was pumped to the surface. The Miami Copper Co. bought 732,000,000 gals. for use in its concentrator.

The "A" shaft, or main working shaft, on the eastern side of Pinal creek, in the west section of the mine, is equipped with skips. This shaft is connected with the principal workings of the mine by underground trolley lines, including a line to handle the ore of the Gladiator mine, which has yielded a notable quantity of smelting ore, and large quantities of concentrating ore. Ore extraction is mainly from the 800', 1,200' and 1,600' levels, where large ore pockets have been cut in preparation for the new concentrator. "A" shaft has 5 compartments, 2 equipped with 3-deck cages, and 1 with a 2-deck cage. Equipment includes a steel engine house, built 1910, having a 17x31x48" Nordberg compound hoist, good for 2,000' depth.

"B" shaft, on the eastern side of Pinal creek, bottomed on the 14th level, has 4 compartments and a 100,000 cu. ft. fan for ventilation. "C" shaft is bottomed on the 12th level. "D" shaft, 1,000' deep at the 14th level, is located on the western side of Pinal creek, about 2,000' west of the most westerly previous workings. The "K" shaft, 1,400' deep, is now ready for ore hoisting. The Transit shaft, about one-half mile east of "A," was crosscutting in both directions, at approximately the 2d level of the main mine, at the end of 1910. The Kingdon shaft, 1,400' deep, is one of the 2 main working shafts, 1913. The Grey shaft, now connected with the 1,200' level, has a 75-h. p. Wellman-Seaver-Morgan electric hoist, and is to be developed. The property has a number of smaller shafts and several tunnels, not in present use.

The mine, mill and smelter are connected by a private railway, equipped with a 14x20" Porter locomotive, and 50-ton ore cars.

A new crusher plant and sampling mill were erected in 1913.

The old 300-ton concentration mill, erected 1909, is of structural steel, on concrete foundations, with iron siding and roof. Equipment includes 18 Frue vanners and 9 Wilfley tables. The plant is entirely automatic and of excellent design and practice. The average of all ores treated in the concentrator is about 3.6% copper, and, owing to the large amount of iron, the ratio of concentration is very low. In connection with the mill is a sampler of about 125 tons daily capacity, for custom ores.

A new mill now under construction will be ready for operation in the winter of 1913-14.

The smelter does custom work, and was formerly an extensive purchaser of sulphide ores for fluxing the oxidized ores of the Old Dominion and United Globe mines, but latterly these mines have developed such quantities of sulphides, in the lower workings, that the amount of custom ore handled has been materially reduced.

The smelter has 8 double storage bins, holding 1,000 tons of coke, limestone and ore. Mixing, weighing and charging are done automatically, requiring a force of only 4 men. There are 6 blast furnaces, 44x180" set tandem, with settlers between, charged automatically from side-dumping

cars. The furnaces have a nominal capacity of about 2,400 tons daily, but one furnace is held in reserve. The dust-flue chamber is 20x20x250', connecting with a 200' smokestack, of 23' diameter at the bottom and 14' at the top, set on a base 25' above the tuyeres. Flue dust is briquetted for re-smelting, and is treated at the Copper Queen plant at Douglas. Fuel is New Mexican coke, from the Dawson Coke Co. The smelter is served by an electric locomotive and three 3,000-lb. tilting cars for charging, with a steam locomotive and dump-cars for slags.

The converter department has 3 stands, with Great Falls type, basic lined, 7.75x12' shells. Shells are handled by a 40-ton electric traveling crane. The converters take 50% matte, and turn out blister copper of 99.5% copper with small silver values. The converter slag yard is 18x70', with a floor of 2" iron plates, laid on brick bedded in concrete.

The slags of the old oxide smelting days have been resmelted, gradually, with an average recovery of about 2% copper.

The power plant at the smelter includes a 2,300-kw. generator and two 750-kw. generators, direct-connected to General Electric horizontal low-pressure steam turbines, utilizing exhaust steam. All machinery, except hoists and compressors, is actuated electrically. There is a 30-drill Nordberg compound air compressor, with intercooler and water-jacketed air cylinders, and a complete electric light plant. Furnace blast is supplied by Connersville blowers of 45,000 cu. ft. per minute aggregate capacity, and an 18,000 cu. ft. Nordberg air compressor furnishes converter blast. Fuel oil is used for the boilers.

The smelter production is larger than the mine production, because the smelter treats ores of the United Globe and a considerable amount of custom ore. Production has been: 28,919,217 lbs. fine copper in 1905; 16,602,186 lbs. copper, 74,123 oz. silver and 1,798 oz. gold in 1906; 23,294,496 lbs. copper, 69,067 oz. silver and 2,407 oz. gold in 1907; 30,308,223 lbs. copper; 65,486 oz. silver, and 2,313 oz. gold in 1908:

Recent production is as follows:

	1913.	1912.	1911.	1910.	1909.
January	2,727,000	2,044,000	2,095,000	2,130,000	3,668,000
February	2,381,000	2,039,000	2,378,000	2,035,000	2,924,000
March	2,853,000	2,432,000	2,563,805	2,674,000	2,970,000
April	3,040,000	2,167,000	2,535,000	2,325,000	2,840,000
May	2,749,000	2,161,000	2,363,000	2,174,000	3,088,000
June	2,511,000	2,130,000	1,907,000	2,092,000	2,300,000
July	2,526,000	2,212,000	2,114,000	2,092,000	2,300,000
August		2,620,000	1,982,000	2,693,000	3,260,000
September		2,223,000	2,032,000	2,262,000	2,672,000
October		2,523,000	2,014,000	2,345,000	2,660,000
November		2,758,000	2,082,000	2,750,000	2,300,000
December		2,262,000	2,610,000	2,287,000	2,400,000
Total		27,571,000	26,675,805	27,974,000	33,882,000

Costs, per ton of ore treated, were \$8.82 in 1909, and \$8.67 in 1910. Cost of finished copper was 9.72 cts. at the mine, with eastern costs of 1.54 cts., giving a total cost of 11.76 cts. per lb., in 1909, reduced to 10.16 cts. per lb. in 1910, and 9¾ cts. in 1913. The mine and smelter are in better shape than ever before and very much credit is due Dr. Ricketts for the rehabilitation of the property.

There has never been a time in the history of the property when there has been as much high-grade ore in sight as at present, particularly in the

lowest levels and the property is assured of a successful future, being in exceptionally able hands.

OLD GLORY MINE.

ARIZONA

See Oro Mine, Santa Cruz Co., Ariz.

OLD GLORY MINE.

OREGON

Arthur H. Gruber, Milwaukee, Wis., chief owner. Mine on Silver creek in western Josephine county, Ore., shows a very large lode of low-grade copper ore carrying gold and silver values. Property was to be equipped with machinery in Oct., 1913, and development pushed.

OLD HUNDRED MINING CO.

COLORADO

Office: Room 706, Electric Bldg., Cleveland, Ohio. Mine near Silverton, San Juan Co., Colo. Howell Hinds, pres.; W. S. Briggs, sec.-treas.; preceding officers, H. H. Burgess, E. P. Price and Frank S. Whitcomb, directors; J. M. Elmer, supt. Organized June, 1906, under laws of Maine, capitalization \$5,000,000, shares \$5 par.

The company has authorized \$400,000 of series "A" first mortgage 6% bonds, none issued. Is said to have had a floating indebtedness, 1910, of \$150,000 and to be heavily in debt to President Hinds. The mine was floated by Thos. Nevins & Sons, of New York, who advanced the money for its equipment and development, and despite stock sales, lost \$20,000 in the undertaking, when they relinquished their interests.

Lands, 26 claims, patented, 500 acres, in Cunningham gulch, on Galena mountain, San Juan district, 5 miles north of Silverton. The Silverton & Northern railway runs to the mine. The property shows a quartz vein said to be 5 to 12' wide, carrying values in gold, silver, lead and copper, with increasing copper at depth, ore being claimed to carry average values of \$8 to \$12 per ton. Development is mainly by tunnel, and mine is claimed to have upwards of 4 miles of workings.

Equipment includes steam and electric power with a central power station of steel and concrete. There are numerous buildings, including a store, and the mine has a tramline.

The 200-ton mill has 40 stamps, crushers, rolls, jigs, Frue vanners, concentrating and slime tables.

The property was promoted in New York upon representation by engineers that the mine contained bodies of low-grade ore which could be profitably mined if a larger output and lower milling cost could be secured. Despite the new machinery furnished and development done, the mine failed to redeem the promises made and is still awaiting some one who can make it pay by right management and proper ore treatment. Stock regarded as of little value, but property likely to be reopened.

OLD PUEBLO MINING & MILLING CO.

ARIZONA

Is controlled by the Tucson Consolidated Copper Co. and described under that title.

OLD SPORT GROUP.

BRITISH COLUMBIA

Also known as Elk Lake group, 27 miles from S. E. arm of Quatsino sound, B. C. Wm. Halliday, Alert bay, B. C., owner. Property, 14 claims, showing 2 veins, uppermost 30' wide, traceable 3,000', opened for 14' in depth and assaying \$6.60 to \$54. The lower vein, 13' wide, traceable 2,700', consists of chalcopryrite with gold values, ore varying from \$37 to \$60 in value.

OLD TOWN MINING, MILLING & TRANS. CO.

COLORADO

Geo. K. Kimball, mgr., Idaho Springs, Clear Creek Co.; J. A. Redding, supt., Russell Gulch, Gilpin Co., Colo. Company succeeds the Old Town Consolidated Mining Co., which itself was the successor of the Old Town Mining & Milling Co., both defunct.

Property holds the Wautauga vein, carrying a paystreak of a foot or less average width, with gold and silver-bearing copper ore. Development by 900' shaft with 2,205' of workings. Equipment includes steam and electric power and Leyner air compressor.

Property has not been profitable save to the employees and was sold for a debt of \$60,000 at sheriff's sale, June 15, 1910.

OMAR MINING CO.

ALASKA

Idle. Mine near Kiam, at head of McKenzie inlet, 20 miles south of Hadley, Prince of Wales island, Alaska. Chas. E. Ladd, pres.; W. A. Howe, vice-pres.; C. E. S. Wood, sec.-treas.; W. W. Catlin, gen. mgr.; H. W. Turner, supt., at last accounts. Organized 1904, under laws of Oregon.

Property, the Khayyam mine with 6 claims, unpatented, 80 acres, showing schistose diorite carrying 4 parallel ore zones with 5 elongated lenses of 4 to 40' estimated width, carrying chalcopryrite, associated with pyrite, marcasite, some pyrrhotite and occasional sphalerite, giving average assays of about 3% copper, with small gold and silver values, latter being mainly from marcasite. Development is by tunnels of 140', 240' and 650', with about a quarter mile of workings, the main lens being estimated, by the management, to carry 400,000 tons of ore. A full geological description, with sections, is given in U. S. Geol. Surv. Bull. 347, p. 135.

Equipment includes a 4,186' aerial tram and a 12,160' ground tram, ending at ore bunkers built on a wharf on McKenzie inlet. The old management was overenthusiastic, and built a tramway and wharf before a mine was opened. Production, 1907, is reported by the president as 3,800 tons of ore averaging 2.1% copper, equal to 79,800 lbs. fine copper. Idle some years and property for sale, at last accounts.

ONECO COPPER MINING CO.

MICHIGAN

Office: 62 Devonshire St., Boston, Mass. Mine office: Hancock, Mich. John D. Cuddihy, pres.; John Brooks, sec.-treas.; John L. Harris, gen. mgr.; preceding officers, Wm. F. Fitzgerald, Geo. Napier Towle and John C. Watson, directors. Organized Dec., 1898, under laws of Michigan, capitalization \$2,500,000, shares \$25 par, \$5.50 paid in; issued, \$1,750,000 June 9, 1913. Levied a 50-ct. assessment Jan. 15, 1906, a \$1 assessment Feb. 21, 1910, and a \$1 assessment Oct. 10, 1912.

Treasurer's report, Jan. 1, 1913, showed cash and loans, \$31,068, with \$28,500 still to be paid on last assesment. Annual meeting, third Thursday in March. Stock traded on Boston curb. Company its own transfer agent; Federal Trust Co., Boston, registrar.

Property, 800 acres in Houghton county, all on the Keweenaw copper formation, in Secs. 2, 10 and 11, T. 56 N., R. 33 W., forming a main tract of 640 acres, and a smaller tract of 160 acres, adjoining, diagonally, on the N. E. corner. The property lies east of the Franklin Junior and Rhode Island mines, but is separated therefrom by a quarter mile of intervening lands.

The mine, originally called the Hungarian, was opened by a shaft, sunk 1862 to depth of less than 100', that gave a good showing. A little exploring was done, 1890, by Capt. Wm. A. Dunn, and again in 1898, previous to the formation of this company, when a rich outcrop of conglomerate was found to be a drift boulder of large size, and not rock in place. Work was begun by the company June 26, 1899, on a 2-compartment shaft that was sunk 500'. A little drifting was done on the upper levels, showing a bed of fair width, carrying a little copper, and the shaft cut a narrow fissure, rich in copper, this being of interest because 1 of the few productive cross-veins found in the Portage Lake district. The bed on which the shaft was

sunk has been variously identified as the Isle Royale, Grand Portage and Kearsarge amygdaloids, but is now termed the Oneco amygdaloid.

Work was suspended 1900, and the property was idle, except for a little work, 1906-07, until resumption Aug., 1909, when a campaign of diamond drilling was begun and continued 1910, 10 drill holes being bored, cutting the Oneco bed, on which the shaft is sunk, and an unidentified amygdaloidal bed, called the Torch Lake or Tomahawk lode, lying about 1,200' west of the Oneco, both beds giving cores showing more or less copper. Drill holes were bored to depth of 1,000 to 1,700', locating the eastern sandstone and giving 2 complete cross-sections, 2,700' apart.

The mine was reopened Nov., 1910, and drifting resumed on the 4th level. Since then the shaft has been sunk to a depth of 1,250' and extensive drifting on the 9th, 10th, 11th and 12th levels, both north and south of the shaft, has shown the vein to be 10 to 20' wide and well mineralized. At the present time development is confined to the 11th and 12th levels.

ONN COPPER MINING CO.

CALIFORNIA

Idle. Mine near Coram, Shasta Co., Cal. Alfréd Onn, pres.; W. C. Onn, sec.-treas.; Arthur E. Onn, Frederick S. Lanyon and J. C. Isaacs, directors, at last report. Organized 1909, under laws of Arizona, capitalization \$2,000,000, shares \$2 par. Lands, 22 claims, 440 acres, known as the Spread Eagle group, showing a gossan giving assays of \$3 to \$8 per ton in gold, with some silver and copper. Mine is claimed to have 4,000' of workings, showing ore carrying copper and a little gold. Was under lease to the Shasta Copper Exploration Co. to Oct. 1, 1912, for \$125,000.

ONONDAGA COPPER CO.

MICHIGAN

Office: Houghton, Mich. Reginald C. Pryor, pres., treas. and gen. mgr.; J. H. Rice, vice-pres.; Wm. Duffney, sec.; Ward B. Smith, mg. engr., and D. L. Robinson, directors. Organized April 22, 1912, under laws of Michigan, capitalization \$3,750,000, shares \$25 par, \$4 paid; issued, 99,955. Annual meeting, second Thursday in May.

Property, 10,230 acres in Ontonagon county, Mich., near the White Pine mine of the Calumet & Hecla Co. The formation, a fine-grained sandstone, has been exposed by surface trenching at several points and found to carry flake copper in considerable quantity. The values appear to be patchy, but as the ore frequently averages 10% where cross-faults occur, a commercial average may reasonably be expected.

Development is confined to diamond drill work intended to give a geological cross-section and from which the manager can formulate a plan of underground development. The first hole completed in Jan., 1913, has a depth of 1,912' and is apparently in the horizon of the Isle Royale-Arcadian lode. Hole No. 2 was 1,500' deep in March, 1913.

ONYX GROUP.

COLORADO

Address: John Rahrer, Leadville, Colo. Property in Half Moon gulch, on French mountain, shows a vein with high-grade gold-copper ore.

OPEX CONSOLIDATED MINES CO.

UTAH

Address: care Jesse Knight, Provo, Utah. Mine near Robinson, Juab Co., Utah, leased to Emerald Mining Co. See Vol. X.

OPHIR GOLD & COPPER MINING CO.

MONTANA

Mine office: Blackfoot City, Powell Co., Mont. M. A. Mitchell, pres. and gen. mgr.; W. Y. Clark, vice-pres.; W. F. McCarthy, sec.; F. E. Elmen-dorf, treas. Capitalization \$1,000,000. Lands, 5 claims, patented, near Ophir, having a fissure vein carrying gold-copper ore of fair assay tenor. Development includes 200' shaft with levels at 100' intervals, disclosing stoping ore. Equipment includes steam power and hoist. Mine was worked in 1912.

OPHIR GROUP.**ARIZONA**

J. A. Kent, Wickenburg, Yavapai Co., Ariz., owner. Property, $4\frac{1}{2}$ miles west of Hot Springs junction, shows a fissure vein carrying ore said to average 10% copper and 26 oz. silver per ton. Mine under development, 1913.

OPHIR HILL CONSOLIDATED MINING CO.**UTAH**

Office: Miner Bldg., Butte, Mont. Mine office: Ophir, Tooele Co., Utah. Hon. Wm. A. Clarke, pres.; W. C. Siderfin, sec.; E. W. Clark, treas. and gen. mgr.; preceding officers and Chas. W. Clark, directors; Jos. W. Pyle, cons. engr; A. G. Swanson, mine supt.; John Franks, mill supt.; Haines Gridley, engr. Company is managed as a close corporation.

Property, about one-half mile north of Ophir, carries the Tot vein averaging about 5', the Big vein about 20', the Middle vein about 10', the Copper vein about 8', and the Blue vein about 6' in width. Ore is mainly argentiferous galena, associated with pyrite, averaging about 8% lead and 10 oz. silver per ton, but also includes some copper and zinc ores, with occasional gold values, a little copper being produced as a byproduct. Ores occur as replacements in argillaceous limestone and shale, in 3 clearly-defined shoots, known as the Delirium, Miner's Delight and Western Stope. The mine is opened by an 1,800' incline shaft, stopes standing well without timbering, but is somewhat wet on the bottom levels, and has a 250-gallon electric pump.

Equipment includes a steam plant, with hoist, and there is a gravity tramway from the mine to the mill, of 150 tons daily capacity. Production has averaged about 50,000 tons of ore yearly, for some years past, and the property is an excellent one. A branch line of the S. P., L. A. & S. L. R. R. was built to the property in 1912.

OPHIR KING GOLD MINING CO.**UTAH**

Office: 60 East South Temple St., Salt Lake City, Utah. Mine office: Ophir, Tooele Co., Utah. Martin S. Lindsay, pres. and treas.; R. Lovendahl, sec. Organized Nov., 1907, under laws of Utah, capitalization \$10,000, shares 2 cts. par, assessable. Lands, 30 acres, patented, 9 miles from railroad, adjoining the Ophir Hill and Cliff Mining Co.'s properties and carry auriferous and argentiferous copper and lead ores. Mine has 400' tunnel, with some crosscutting, and several shallow shafts. Property worked under lease in 1913.

OPHIR QUEEN MINING CO.**UTAH**

S. Crawford, former president, Cedar River, Mich., controls property. Fully described Vol. VIII.

OPHIR-UTAH MINING CO.**UTAH**

Idle. Office: Salt Lake City, Utah. Mine near Ophir, Tooele Co., Utah. G. G. Schliep, pres.; C. L. Olson, sec.-treas. Organized Feb. 13, 1909, under laws of Utah, capitalization \$250,000, shares 25 cts. par, nonassessable. Lands, 7 claims, 9 miles from railroad, show copper and lead ores. Has several buildings and a hoist.

OPOHONGO MINING CO.**UTAH**

Office: Provo, Utah. Mine address: Samuel Cox, supt., Eureka, Juab Co., Utah. Wm. Hatfield, pres. and mgr.; J. H. Hatfield, vice-pres.; J. W. Hatfield, sec.-treas. Organized 1908, under laws of Utah, capitalization \$250,000, shares 25 cts. par, assessable. Shares are listed on the Salt Lake Stock Exchange. Dividends, three 1-ct. and two 2-ct. declarations in 1911-12 and one of 1 ct. on Jan. 30, 1913.

Lands, 3 claims, patented, in the vicinity of the Black Jack and Ajax mines. The mine is opened by shafts and tunnels, with about 2,000' of workings, to depth of 1,000', with principal development on the 500' and 700'

foot levels. The mine is operated jointly with the Gold Chain, with which it is connected on the 300' level, and hoisting is through the Black Jack shaft. The 450' level shows an 18' orebody, said to give assays up to 10% copper and \$90 to \$650 gold per ton. The 700' level shows this same ore shoot. Present development is mainly in the main tunnel of Gold Chain mine, now being driven to cut the main vein. The 1,000' level shows the fissure in the east drift, but no ore, as the ore shoot has not been reached. Three sets of leasers are at work in the upper levels and are getting high-grade copper ore on the 450' level.

Machinery equipment, owned jointly with the Gold Chain, includes an air compressor. Production has been intermittent since it began in 1909. In 1913, it averaged 150 tons of smelting ore a week, most of it from the 500' level.

ORANGE MINE.

VERMONT

Mine address: Strafford, Orange Co., Vt. J. B. Reynolds, mgr. and principal owner; Lovat Fraser, engr. Lands, 900 acres, held under deed of mining rights, are near the Elizabeth mine, 13 miles from the Boston & Maine railway. Property carries a lenticular orebody, conforming to dip of the country rocks, which include gneiss, under garnetiferous mica-schist and above hornblende-schist, with strike of west of north, and average dip of about 45°. The lens, of 40' extreme width, but not mineralized for the full width, is traceable 4,000' on the property. Ore carries chalcopryrite, disseminated in massive pyrrhotite, averaging 2% copper. The mine has a 110' incline shaft, with about 70' of laterals on the 100' level. Equipment includes steam boilers, a 3-drill air compressor and several mine buildings. Geology is described, Bull. 455, U. S. Geol. Survey.

ORE CHIMNEY MINING CO., LTD.

ONTARIO

Office: 74 Tisdale St., Hamilton, Ont. Mine office: Northbrook, Frontenac Co., Ont. Anson E. Fletcher, pres.; J. D. Misener, vice-pres.; Chas. Narraway, sec.-treas.; preceding officers, Richard Haggerty, Chas. Zinn, S. A. Edick, J. M. Slater and John M. Fletcher, directors. Organized Oct. 11, 1909, under laws of Ontario, capitalization \$600,000, shares 40 cts. par, non-assessable. Annual meeting, last Tuesday in October. The property was bought of the president for 850,000 shares of stock.

Lands, 6 claims, 300 acres, in the Eastern mining district, about 11 miles from Kaladar, the nearest C. P. R. R. station. Property shows limestone, conglomerate and schist, and is reported by the management to have a 20' vertical quartz vein traceable 4,000' and carrying galena and chalcopryrite, the ore averaging 1.5% copper, 17% lead, 2% zinc, 68 oz. silver and \$6.60 gold. Development is by 4 pits of 12 to 175' depth.

The property has 120-h. p. plant, 6-drill compressor and hoist good for 500' depth. Property is 60 miles from Kingston. Company plans sinking shaft 200' deeper and doing 2,000' of drifting in 1913, and will erect a 500-ton concentrator, 2,000-h. p. electric plant and numerous buildings. Company's prospectus has been subjected to criticism on account of its inaccuracy and misstatements, but company is developing and apparently successfully.

ORE FINDER MINING CO.

MONTANA

Address: John Hickey, manager, Victor, Mont. Property, 3 miles south of Victor, Ravalli county, has been developed by 200' shaft, with 700' drifting on the vein, showing an oreshoot carrying copper with gold and silver values. Mine has steam hoist.

ORE GULCH MINING CO.

CALIFORNIA

John Chambers, superintendent, Tecopa, Inyo Co., Cal. Property shows silver-bearing lead-copper ores, in a vein that is developed by several short tunnels.

OREGON-ARIZONA COPPER CO.**ARIZONA**

Mine near Superior, Pinal Co., Ariz. Has steam power. Is under bond and lease, and now said to be controlled by Jack Newman and associates.

OREGON & BRITISH COLUMBIA MINING**& DEVELOPING CO., LTD.****BRITISH COLUMBIA**

Office: 304 Lewis Bldg., Portland, Ore. Mine at Copper mountain, near Princeton, B. C. W. J. Peddicord, pres.; G. B. Tucker, vice-pres.; G. Evert Baker, sec.-treas. and gen. mgr. Organized Jan. 6, 1906, under laws of Oregon, capitalization \$150,000, shares 10 cts. par, nonassessable; issued, 1,026,059.

Lands, 8 claims, crown-granted, 379 acres, well timbered, in the Yale district, B. C. Claims show diorite cut by diabase carrying patches, stringers and disseminations of chalcopyrite, bornite and magnetite, without quartz. The ore carries from $1\frac{1}{2}$ to $3\frac{1}{2}\%$ copper and is said to show as high as \$4.50 gold per ton. Development consists of a 176' tunnel, reported by the management to show 40' of mineralized ground, carrying auriferous and argentiferous chalcopyrite and bornite, the last 8' of the tunnel being said to show an 8' vein of solid ore, with 18" to 2' of talc gangue. Property also has shafts of 33' and 35'. Claims adjoin the Sunset mine and other properties of the British Columbia Copper Co.

OREGON-IDAHO INVESTMENT CO.**OREGON**

Idle. Mine office: Baker City, Baker Co., Ore. Jas. A. Howard, pres.; John Arthur, vice-pres.; Fred R. Mellis, sec.-treas. Capitalization \$50,000; surplus \$15,000 Sept. 10, 1913. Is a small, close corporation organized as a developing and holding company, but whose chief business since 1909 has been the operation of the Baker City, Ore., ore-sampling plant, burned April, 1911, but rebuilt later in the year.

Property includes the Poorman group, 8 claims, 160 acres, surveyed for patent, on Balm creek, 25 miles N. E. of Baker. The group shows a copper-bearing vein for 2,000' that has a gossan cap 200' wide in places.

Development consists of an 800' tunnel with 30', 40' and 50' crosscuts at depth of 100' showing 2.5 to 3.5% copper, present as chalcopyrite.

O'REILLY GOLD MINING CO.**COLORADO**

Mine near Breckenridge, Summit Co., Colo. A. C. Howard, superintendent, at last accounts. Owns the Bay State mine, developed by a 300' tunnel, showing auriferous and argentiferous copper ore.

ORFORD NICKEL-COPPER REFINERY.**NEW JERSEY**

Property of International Nickel Co., 43 Exchange Place, New York. Plant at Bayonne, N. J., treats nickel-copper matte from Sudbury smelter. Robt. R. Maffet, gen. supt., Robt. C. Stanley, asst. supt. of plant.

ORGAN MOUNTAIN MINING CO.**NEW MEXICO**

Office: Las Cruces, Dona Ana Co., N. M. Mine office: Organ, N. M. F. M. Hayner, pres. and gen. mgr.; N. B. May, vice-pres.; F. W. Campbell, sec.; C. Gill, treas.; L. A. Hurley, supt. Organized 1912, under laws of New Mexico, capitalization \$2,000,000, shares \$1 par, fully paid and nonassessable; issued, about 1,100,000.

Property, 17 claims, partly patented, showing limestone and granite contacts, having several orebodies, 3 of which have been developed. Company reports orebody to have average width of 10', length of 1,000' and a proven depth of 400', and to carry ores assaying 11% copper, 2% lead and 20 oz. silver per ton.

Development amounts to 7,800' with a 2,800' working and a 600' exploration tunnel and working shafts, 400' and 300' deep respectively. Mine said to be an old one discovered 1850, worked in 1880 and closed 1911.

Equipment includes 200-h. p. plant at mine and 250-h. p. plant at mill.

together with 2 hoists and 2 air compressors of 10-drill capacity combined. Mill includes 2 Joplin jigs, 3 Wilfley tables, 1 vanner and 2 slimers. Mine is 12 miles from A. T. & S. F. R. R.

Property formerly belonged to the Bennett-Stephenson Mining & Milling Co. Present company plans sinking 3-compartment shaft from 600' to 1,000' level and repairing the mill.

ORIENT GOLD MINES, LTD.

WASHINGTON

Office: 511 Hyde Block, Spokane, Wash. Mine at Orient, Ferry Co., Wash. Frank Ansley, pres. and mgr.; E. E. Doan, vice-pres.; Thos. R. L. Harris, sec.-treas.; L. F. Hachess and Geo. Burness, directors; R. Strawhun, supt. Capitalization \$1,500,000.

Property, the White Elephant mine with 6 claims, located 3 miles south of the Canadian border, and an equal distance from Rock Cut. The mine is a gold producer but contains gray copper ore. The mineral zone, 75' wide, lies between diorite and andesite.

Development consists of a 225' incline shaft sunk on the vein with a dip of 70° E. Workings on the 100' level show disseminated pyrite ore carrying from \$3 to \$6 per ton, with occasional shoots of copper ore. Equipment includes steam plant, compressor, sawmill, etc.

Company also owns claim in Pend Oreille district, Idaho. Property promising.

ORIENTAL COPPER CO.

ARIZONA

Idle. Office: St. Louis, Mo. Mine near Cave Creek, Maricopa Co., Ariz. W. F. McDonald, pres.; John B. Cabanne, vice-pres.; F. W. Irland, sec.-treas., at last accounts. Organized 1904, under laws of Arizona, capitalization \$2,000,000, shares \$1 par.

Lands, 19 claims and a 5-acre mill site, 385 acres, having a 475' tunnel in schist, said to crosscut veins showing ores that have given assays of 8.9% copper and 6.8 oz. silver per ton, with occasional small gold values. Poorly developed, and not regarded favorably.

ORIGINAL BLUE BIRD COPPER MINING CO.

CALIFORNIA

Mine office: Oasis, Mono Co., Cal. Capitalization \$1,500,000, shares \$1 par. Mine, 2 miles south of Oasis, having shafts of 80' and 130', made shipments, 1865, of high-grade ore, ranging up to 250 oz. silver per ton, and is claimed to have, on an old dump, several hundred tons of ore averaging 10% copper, 35 oz. silver and \$2 to \$12 gold per ton. Formerly had a mill. Shut down several years and company probably bankrupt.

ORIOLE COPPER MINING CO.

WYOMING

Office: Douglas, Wyo. Mine office: Clarence, Converse Co., Wyo. Hon. C. D. Clark, pres.; T. H. Howard, vice-pres.; E. J. Wells, sec.-treas. and gen. mgr.; Chas. J. Wells, supt., at last accounts. Organized 1902, under laws of Wyoming, capitalization \$750,000, shares \$1 par.

Lands, 4 claims, 80 acres, in the War Bonnet district, carrying an 8' fissure vein in granite, opened by shafts of 75' and 255', showing carbonate ore assaying about 6% copper, with traces of gold and silver. Had a 40-h. p. steam plant, with a hoist and 2-drill Leyner air compressor. No returns secured.

ORMUS MINE.

MEXICO

J. A. McGimsey, manager, Cumpas, Sonora, Mex. Property shows a vein carrying a narrow streak of tetrahedrite ore developed by a 300' shaft with drifts on 2 levels. Shipments to Douglas smelter are said to have run 3% copper and 355 oz. silver per ton. Company plans sinking shaft to 400' level.

ORO COBRE MINING CO.

ARIZONA

Address: Thos. Wilkinson, pres. and gen. mgr., 715 High St., Burlington,

Iowa. Operating office: Prescott, Ariz. Mine office: Wenden, Yuma Co., Ariz. Judge John J. Hawkins, vice-pres.; S. M. Wilkinson, sec.-treas.; R. R. MacDonald, supt. Organized Oct., 1901, under laws of Arizona, capitalization \$1,500,000, shares \$1 par, nonassessable; fully issued. Annual meeting, second Tuesday in February.

Lands, 14 claims, 280 acres, in the Tank Pass section of the Harcuvar mountains, Ellsworth district, 12 miles west of Wenden. The claims show diorite, schist, granite and porphyry, carrying several fissure veins, ranging from a few inches to 20' in estimated average width, carrying oxidized ores near surface, giving assays of 12 to 15% copper, and \$1.50 to \$80 per ton in combined silver and gold values, with chalcopryrite, at shallow depth. Mine is opened by shafts of 240', 150' and 40', and a tunnel of 175' with 700' of workings. Management reports 2' of high-grade auriferous and argentiferous chalcopryrite at bottom of the 110' shaft. The neighboring mines are said to show bornite at depths of 300 to 500' and to be shipping ore in 1913, from similar orebodies in this contact zone.

ORO GRANDE MINES CO.

ARIZONA

Office: Clinton, Ia. Mine office: Wickenburg, Maricopa Co., Ariz. G. E. Lamb, pres. and treas.; Geo. B. Upton, vice-pres. and gen. mgr.; F. W. Ellis, sec.; and T. G. Norris, directors. Organized 1901, under laws of Arizona, capitalization \$3,000,000, shares \$10 par, nonassessable; issued, \$2,500,000. Is a close corporation, controlled by 6 shareholders. Annual meeting, second Tuesday in January.

Is a gold-mining company, but the ores carry considerable copper and if transportation by rail were available, mine might be worked for copper, if reports are correct.

Lands, 9 claims, patented, area 161 acres, in the Black Rock district of Yavapai county, Ariz. The property shows 3 contact deposits, between diorite and hornblende-schist. The 1 under development, with strikes of N. 27° E. and vertical dip, is estimated by management as 170' wide, traceable 4,400' carries oxidized ores, bornite and chalcocite, with gold values estimated to average \$5.40 per ton. The mine is developed by shafts of 320', 100' and 100', with about 8,000' of workings and is reported to have blocked out 980,000 tons of ore.

Equipment includes a 55-h. p. gasoline plant at the mine, with a 15-h. p. hoist and 5-drill Sullivan air compressor. There are 14 buildings, including necessary shops.

The 50-ton mill has ten 1,050-lb. stamps with a 40-h. p. gasoline engine; water is pumped, for milling, from Box canyon on the Hassayampa river.

The manager reports a saving by straight amalgamation of 99% of assay values and having made 60-day mill-runs with a total cost of \$1.87 per ton, for mining, milling, pumping and all expenses, which is interesting, if true. Management plans deepening the main shaft to 1,000'. Property promising.

ORO MINE.

ARIZONA

G. B. Williams, owner, Rochester, N. Y. Property, the Old Glory, or Oro mine, in the Oro Blanco district, 30 miles west of Nogales, Santa Cruz Co., Ariz. Mine shows a 16' fissure vein with a 5' paystreak of silicious sulphide ore carrying copper and lead with gold and silver values.

Development carried on since 1911 consists of a 350' shaft with 2 levels and ground opened for stoping.

ORO-PLATA MINE.

ARIZONA

Address: O. B. Stanton, superintendent, Kingham, Mohave Co., Ariz. Property is a gold mine, producing lead-copper ore, with gold and silver values. Development is by shaft, equipped with gasoline hoist. Mine has mill with 2 Nissen stamps.

ORO QUAY GOLD MINING & REDUCTION CO. COLORADO

Idle. Mine, 12 miles south of Ortiz, Conejos Co., Colo., shows considerable bodies of magnetic iron ore, some of which carry good assay values in copper, silver and gold. Was leased, 1908, to Colorado Fuel & Iron Co., which did a little development work.

OROVILLE CONSOLIDATED MINING CO. WASHINGTON

Letter unclaimed at Oroville, Okanogan Co., Wash. E. Macammon, pres.; W. C. Hancock, vice-pres.; A. Signs, sec.; R. Coil, treas., at last accounts. Lands, known as the Sunset group, have a vein of 6' reported average width, carrying copper ore of good average grade, developed by a shaft that was planned to be sunk 400'.

ORPHAN BOY MINING CO. UTAH

Office: Milford, Utah, James R. Craig, pres.; W. D. Williams, vice-pres. and mgr.; Chas. A. Doe, sec.-treas.; foregoing with M. R. Williams and Geo. H. Williams, directors.

Property in Star district, 20 miles S. W. of Milford, in Beaver county, Utah. District shows limestone, cut by quartz monzonite, with ore in veins and replacements. There are 11 claims, adjoining the Red Warrior and Mowitza mines, developed by 500' shaft with 1,200' of tunnels and workings from which considerable high-grade ore has been shipped. Vein, though narrow, has bodies of lead-carbonate ore carrying a little copper.

ORPHAN COPPER CO. ARIZONA

Mine address: Miami, Gila Co., Ariz. Chas. M. Clark, vice-pres. and gen. mgr. Organized May 15, 1908, under laws of Arizona, capitalization \$3,000,000, shares \$5 par, nonassessable; fully issued. Stock was relisted, 1910, on the New York curb.

Lands, 10 claims, unpatented, 190 acres, southeast of the New Keystone and near the Miami mine. Property is located on the outskirts of the schist belt, showing a contact between schist and granite-porphyry. The company formerly claimed to have 9 vein systems, with a prominent fault, the principal vein under development occurring at the contact of schist with granite-porphyry, being estimated, by the company, to average 30" to 3' in width, traceable 1,000', and to average 5 to 9% copper. This narrow vein is developed to 500' depth, but has shown only thin and small lenses of high-grade chalcopryite ore. Good assays were secured, from a few small stringers, and the company claimed, 1909, to have opened 4 commercial veins, which, unfortunately, was untrue.

Development is by a 560' two-compartment shaft with over 600' of work on the 500' level, cutting several small, commercially valueless veins. There also are pits and shallow shafts of 10 to 40' depth, with 720' of laterals. The main shaft shows a 30" vein carrying chalcopryite, assaying up to 20% copper, with gangue of altered granite and carbonates.

The career of this company on the New York curb was a scandal, the stock exchange house promoting the company manipulating the market until shares sold as high as \$3. After the bubble burst, 161,000 shares were sold at auction in New York, May, 1911, for 1 ct. per share. Property is of doubtful value, but Mr. Clark, the original owner of the ground and the company's manager, is an able miner and still has hopes of developing a disseminated orebody by churn drilling.

OSBORN CONSOLIDATED MINING & MILLING CO. UTAH

Office and mine: American Fork, Utah. S. Osborn, pres. and gen. mgr.; W. D. Loveless, vice-pres.; Alfred J. Osborn, sec.-treas.; preceding officers, J. L. Dunkley and J. W. Storrs, directors. Organized July 17, 1907, under laws of Utah, capitalization \$125,000, shares 25 cts. par.

Property, 9 claims, in American Fork canyon, about 4 miles from Park

City, shows veins of 5 to 8' width, carrying lead values near surface, developed by a number of shallow shafts and short tunnels. The 200' main shaft is sunk at an incline of 42°. Copper ores occur in depth in many of the adjacent mines and are expected here. Development meagre, but sufficient to show that property has promise.

OSCEOLA CONSOLIDATED MINING CO.

MICHIGAN

Office: 12 Ashburton Place, Boston, Mass. Mine office: Osceola, Houghton Co., Mich. Rodolphe L. Agassiz, pres.; Quincy A. Shaw, vice-pres.; Jas. MacNaughton, gen. mgr.; preceding officers, Francis L. Higginson, Thos. N. Perkins, Wm. H. Dwelly, Jr., and Guy W. Currier, directors; Geo. A. Flagg, sec.-treas.; Frank H. Haller, supt.; A. Lincoln Burgan, mill supt.; Chas. D. Hohl, chief engr.; Jas. Rowe, mg. capt. Osceola branch; Jos. Biscombe, mg. capt. North Kearsarge branch; Frank Landers, mg. capt., South Kearsarge branch; John T. Reeder, purch. agt.; Wm. Veale, chief clerk. Organized 1873, under laws of Michigan, and reincorporated, 1903, for a term of 30 years, capitalization \$2,500,000, shares \$25 par; issued, \$2,403,750. State Street Trust Co., Boston, registrar; American Trust Co., Boston, transfer agent. Shares are listed on the Boston Stock Exchange. Annual meeting, second Thursday in March.

This company is controlled by the Calumet & Hecla Mining Co., through ownership of 32,781 shares. Company paid 71 dividends, beginning 1878, to end of 1913, aggregating \$11,891,225. Recent dividends have been \$2 in 1904; \$4 in 1905; \$10 in 1906; \$13 in 1907; \$2 in 1908; \$8 in 1909; \$10 in 1910; \$7.50 in 1911; \$12.50 in 1912 and \$10.50 in 1913. Net earnings were \$677,105.39 in 1908; \$1,070,645.14 in 1909; \$758,585.87 in 1910; \$664,627.91 in 1911; \$1,163,288.27 in 1912, equivalent to \$12.09 per share, and company began 1913 with balance of assets \$1,888,458.05, or \$19.64 per share.

Lands, 2,120 acres, in 4 separate tracts, also an extensive mill site, in Houghton county, and in addition there are considerable holdings of timber and miscellaneous lands in Houghton and Keweenaw counties, Michigan. Company's property includes 4 mines, known as the Osceola, North Kearsarge, South Kearsarge and Tamarack Junior, the latter being idle. The various mines employ about 150 power drills, when operated to full capacity.

The Osceola mine proper, 720 acres, lying next south of the Calumet & Hecla, was opened, 1873, on the southern extension of the Calumet conglomerate, upon which 6 shallow shafts were sunk, but this bed proving unremunerative, except under a few acres, work was abandoned thereon, and development begun on the Osceola amygdaloidal bed, lying parallel with and 730' east of the Calumet conglomerate, at surface. The Osceola mine proper has 6 shafts on the Osceola amygdaloid, which has a strike of approximately N. 39° E., shafts being numbered from north to south. Cross-cuts have been sent from the Osceola workings to the Calumet conglomerate, at various depths, without encouragement, and diamond drilling was done, 1904, to locate and test the Kearsarge amygdaloid on the old Osceola tract, but the results presumably were not encouraging. It has been rumored that the company has ceded the right to mine the Kearsarge bed on its property to the Laurium Mining Co., in exchange for certain surface rights.

The 4 northernmost shafts of the Osceola mine proper are abandoned. Nos. 1 and 2 have been abandoned for many years, owing to exhaustion of mineral ground tributary thereto. No. 3, a 3-compartment shaft, of about 3,000' depth, has been idle since 1905, but is used for ventilation and pumping and was given new electric pumps, 1910. No. 4, located 600' S. W. of No. 3, with 3 compartments, is about 3,700' deep, and has been idle since 1906. No. 5 Osceola shaft, 700' S. E. of No. 3, is 4,623' deep. No. 6 Osceola

shaft, formerly known as the Opechee, 1,300' S. W. of No. 5, is 4,592' deep. This shaft shows some good stopes, especially on the lower levels in the southern drifts, toward the Tecumseh mine.

The Osceola branch was thoroughly overhauled and repaired, 1910, to permit more economical work, improvements including electric power for operating the crushers in the shaft rock houses at Nos. 5 and 6.

The shops of the Osceola are centered between shafts Nos. 5 and 6. The plant at No. 6 has 5 Burt locomotive firebox boilers, with a coal trestle and bin, and a 125' brick-lined self-supporting steel smokestack, of 7' inside diameter. The compressor house is equipped with a 50-drill Nordberg 2-stage cross-compound air compressor having 26" and 40" air cylinders, and steam cylinders of 22" and 42", with 48" stroke.

An electric plant, in the compressor house, has a 100-kw. 220-volt d. c. generator, furnishing electric light for the Osceola mine and location, using enclosed arc lamps.

The company owns, at the Osceola location, a large number of dwellings for workmen. Water is secured from Lake Superior through a 1½-mile line of 6" pipe, connecting with a stand pipe at the Tamarack mine, leading to a 130,000-gal. concrete reservoir between Osceola shafts Nos. 5 and 6.

The Kearsarge or North Kearsarge mine, 1,120 acres, lies north of the Wolverine, with which it has underground connections. Extensive diamond drilling, 1905-07, showed considerable good stamp rock in the foot and hanging walls, at points where the main bed was impoverished. Diamond-drill boring costs were \$2 to \$3 per foot, as against \$6 to \$8 per foot for drifting. The Kearsarge amygdaloidal bed ranges 16 to 20' in width, in this mine, and has proven very buncy, though with very good average values. The southern workings, approaching the Wolverine, have shown improvement, but the mine is richest near the Ahmeek, to the north. About 60 power drills are used in this branch.

No. 1 North Kearsarge shaft is 3,873' deep, and has not been deepened for several years. Cavities under the shaft, resulting from old workings, were filled with waste rock, and capped with cement, and the skipway has concrete stringers. No. 1 shaft has a Nordberg hoist good for 6,500' depth, operating two 6-ton skips in balance. No. 2 North Kearsarge shaft was abandoned at depth of 2,400', some years ago. No. 3 North Kearsarge shaft, 1,825' northeast of No. 1, is 3,251' in depth. This shaft develops a large area of good ground, especially in the northern drifts. No. 4 North Kearsarge shaft, begun 1907, sunk 75' in the footwall, is 1,449' deep. The shaft is lined with concrete for depth of 185' from surface, and has large loading bins just below the 10th and 13th levels, to which rock is milled through chutes, from the levels above. The shaft house is of steel, 22x40' on the ground and 105' high, connected with the steel rock house, which is 127' high, built on a 14' concrete foundation, divided in the center by a single railway track. Resting on the concrete foundation is a cylindrical steel rock bin of 40' diameter, 48' high. Equipment of the rock house includes two 40-ton crushers, driven by a special Nordberg rock-house engine.

No. 4 North Kearsarge engine house is 58x84', of brick with steel roof, housing both the hoist and air compressor. The steel frame boiler house has three 84" Pratt boilers, with room for 2 additional. The self-supporting steel smokestack is 150' high, on a sandstone foundation, 7' 10" in diameter at the bottom and 6' 10" at the top, lined with a double layer of brick to height of 50', and above with a single layer.

The North Kearsarge surface plant includes a stone compressor house and a 30-drill compressor at No. 1 shaft, where are located also the combination machine and carpenter shops, warehouse and office, all of wood.

At No. 3 shaft there is a 45-drill compressor, with 2-stage air-end and compound steam-end, having 22x48" and 42x48" steam cylinders, with 40x48" and 36x48" water-jacketed air cylinders, and vertical intercooler, housed in a 25x55' stone and brick building having a steel truss roof. There is a 75-h. p. electric plant, providing electric energy for both the North and South Kearsarge mines.

The South Kearsarge mine, 160 acres, lying south of the Wolverine and east of the Centennial, was known formerly as the Iroquois. Development was begun Sept., 1899, and the best stopes are toward the Centennial line, the Kearsarge bed averaging about the same width as in the North Kearsarge and Wolverine mines, and being remarkably uniform in copper values. This mine is completely developed, both shafts and all but a few of the drifts having reached the boundaries of the property, and the mine is officially stated to have a life of but 4 or 5 years, at the present rate of extraction.

No. 1 South Kearsarge shaft, the northernmost, is 2,820' deep, and practically at the boundary. The shaft rock house is large, but not thoroughly modern in equipment, and may be remodeled; this rock house cares also for rock from No. 2 shaft, with which it is connected by an 1,100' trestle. Two skips are operated in balance. No. 2 South Kearsarge shaft is 1,992' deep.

Surface equipment of the South Kearsarge is mainly second-hand, taken from other branches of the mine, but is sufficient for present requirements, including air compressors of 55 drills aggregate capacity, and 40 rock drills.

The Tamarack Junior mine, 120 acres, lying between the Centennial and Calumet & Hecla, has 2 vertical shafts, on the Calumet conglomerate, No. 2 being 3,360' deep, with 12 levels opened. The Tamarack Junior has been idle since 1903, and apparently is dead for all time to come, so far at least as the conglomerate is concerned, with indifferent prospects of finding other workable cupriferous beds on the tract.

Rock is transported from the various mines to the mills by the Hancock & Calumet railway, a branch of the Duluth, South Shore & Atlantic system.

The mill is built in 2 sections, the main section being 176x213', of steel frame, with 4 Nordberg steeple-compound stamps. These stamps, which are now in very general use in the Lake Superior district, were invented by Mr. Nordberg as the result of some years of experimentation. The stamps have circular mortars, with five-eighths-inch screens, and hydraulic separators, about 20% of the copper secured in milling coming from the mortar discharges and separators. The older section has 3 stamps with circular screens having three-eighths-inch openings, and is otherwise a duplicate of No. 2 mill.

The wash departments of the 2 mills are equipped with Woodbury classifiers and jigs with 6 round tables and 1 Wilfley table for each stamp, the Wilfleys taking headings from the round tables. An Allis-Chalmers Chilean mill reduces over-size material from the stamp mortars and there are crushing rolls and Hardinge mills. Stamping costs were 16.95 cts. per short ton in 1905, and only 11.71 cts. in 1907, the latter figure being the lowest ever reported by any mill, for this work, and milling costs were 13.36 cts. per ton in 1908. No figures of stamping costs have been made public since the change in management.

The steel boiler house, adjoining the mills and furnishing power for both, has three 250-h. p. 72" boilers, delivering steam at 150-lbs. pressure, and nine 250-h. p. 84" boilers operated under 105-lbs. pressure, all of the locomotive-firebox type. Coal is brought to a 500-ton bin, over a trestle, in,

railway cars. An automatic ash discharge washes the ashes through a launder by water flushed from a stand pipe at 3-minute intervals. The boiler house has a 150' brick-lined self-supporting steel smokestack. The power plant has an Allis-Chalmers Corliss engine, operating a 100-kw. Morgan-Gardner d. c. generator, furnishing current for 220-volt incandescent enclosed arc lamps.

The joint pump house of the Osceola and Tamarack mines has two 40,000,000-gal. triple-expansion Nordberg pumps having 22", 40" and 60" cylinders, with three 30" horizontal plungers of 52" stroke and 42" discharge. Water is taken through an 8' tunnel, running 1,275' under Torch lake, with 3" intake holes, guarding against clogging by ice.

Production since 1902 has been:—

Year.	Lbs. fine copper.	Year.	Lbs. fine copper.
1903.....	16,059,638	1908.....	21,250,794
1904.....	20,472,429	1909.....	25,296,657
1905.....	18,938,965	1910.....	19,346,566
1906.....	18,588,451	1911.....	18,388,193
1907.....	14,134,753	1912.....	18,413,387

The cost of copper delivered was 10.29 cts. in 1903; 9.96 cts. in 1904; 10.68 cts. in 1905; 10.89 cts. in 1906; 12.44 cts. in 1907; 10.25 cts. in 1908; 9.47 cts. in 1909; 9.37 cts. in 1910; 9.28 cts. in 1911; 10.36 cts. in 1912.

OSHKOSH-WYOMING MINING CO.

WYOMING

Address: 55 High St., Oshkosh, Wis. Mine near Dillon, Carbon Co., Wyo. O. A. Koch, pres.; E. E. Meeleus, vice-pres.; H. O. Granberg, sec-treas. and gen. mgr. Organized June 20, 1904, under laws of Wyoming, capitalization \$1,000,000, shares \$1 par.

Lands, 11 claims, 220 acres, in the Battle Lake district, carrying 4 fissure veins in gabbro, of 22' estimated average width, opened by shafts of 32' and 72' and a 22' tunnel, showing malachite, azurite and chalcopryrite, estimated to carry average values of 18% copper. Idle some years, but company still pays its taxes and the salary of a watchman at the mine.

OTERO COPPER CO.

NEW MEXICO

Norval J. Welsh, F. W. Houghton and D. Bruce Smith, managers. Office: Brice, via Oro Grande, Otero Co., N. M. Wm. T. Sevoyer, supt. Property, the Garnet mine group, showing deposits of copper-gold ore in fissures, replacements and contact deposits near monzonite porphyry.

Development by 500' shaft with an ore shoot on the 230' level said to run 5% copper and \$6 gold. The mine is equipped with a gasoline hoist.

Property reported, Sept., 1913, under bond and lease to an English syndicate, represented by L. Maurice Cockerill, with J. W. Camphouse in charge as manager. Shipments of 100 tons daily were made in 1913.

OVERLAND GROUP.

NEW MEXICO

Owned by Nick Iyone and John Campbell, Alma, Socorro Co., N. M. Claims show gossan carrying a few dollars in gold. Developed by 120' tunnel with 100' back, cutting an ore shoot carrying chalcopryrite, bornite and copper glance.

OVERLAND MINING CO.

ARIZONA

Mine near Winkelman, Gila Co., Ariz. P. F. Walsh, superintendent, at last accounts. Property adjoins the London Range mine of the London Arizona Copper Co. and "79" mine on the south and west. Claims carry an extension of the main dike system of the London range, showing metamorphic contact orebodies.

Company has new hoist, boilers, etc., installed 1913, and employs 30 men. Hayden Junction is the nearest railway point.

OVERSIGHT MINING & MILLING CO.**WASHINGTON**

Mine office: Republic, Ferry Co., Wash. Harold Preston, pres.; Chas. E. Murphy, vice-pres.; S. E. Dewsnap, sec.; C. A. Wallace, treas.; E. J. Delbridge, gen. mgr., at last accounts. Capitalization \$1,500,000, shares \$1 par.

Lands, 11 claims, adjoining the Copper Key, in the Lambert Creek or Eureka district, north and west of the Turtle river, 10 miles N. E. of Republic, show 4 veins. Mine has about a quarter mile of workings, with a 60' shaft, but principal development is by the Pinmoney tunnel. The wide Pinmoney vein is mainly gold-bearing, arsenical pyrite, carrying small silver and copper values. Has gasoline power, an air compressor and 300-ton shipping bins, and planned an aerial tram. No returns secured.

OWEN LAKE MINE.**BRITISH COLUMBIA**

Frank A. Brown, operator, Hazelton, B. C. Property, 14 miles from the Grand Trunk railroad, in the Hazelton district, shows 5 veins of 4½ to 10' width, carrying complex ores with copper-lead-zinc and silver contents. Mine is reported to be bonded for \$50,000 to the present operator.

OWL COPPER MINING CO.**CALIFORNIA**

Idle. Mine near Indian Gulch, Mariposa Co., Cal. A. A. Leonard, president. Organized June 17, 1907, under laws of Arizona, capitalization \$1,250,000, shares \$1 par.

Lands are the John Diaz copper claim and 2 gold claims; latter near Shingle Springs, El Dorado county, Cal. The John Diaz mine, in Sec. 12, T. 6 S., R. 16 E., near Indian Gulch, has a 168' shaft, developing a 3' vein in schistose diabase, carrying cuprite, azurite, chrysocolla and chalcophyrite, from which ore has been smelted returning 2 to 30% copper and 26 cts. to \$1.78 combined gold and silver values per ton. Equipment includes gasoline power. No recent returns secured.

OWL HEAD COPPER CO.**ARIZONA**

Letter unclaimed at Tucson, Ariz. Mine near Red Rock, Pinal Co., Ariz. Hon. Nott E. Guild, pres.; John B. Wright, sec. Lands, 24 claims, the Apache Princess group, in the Owl Head mountains, 13 miles N. E. of Red Rock. Property shows a zone of reddened schist with eruptives, the conditions resembling those of the schist deposits at Miami and Ray. The workings show copper impregnations in the schist, and to some extent in adjoining granite, giving assays of 0.5 to 3% copper, and 1 to 3 oz. silver per ton. Development is by a shaft, but churn drilling is planned. Property considered promising.

OXFORD CONSOLIDATED MINING CO.**UTAH**

Probably idle. Office: Eureka, Utah. Letter unclaimed at former mine office, Bingham Canyon, Salt Lake Co., Utah. James Crook, pres.; Geo. Owens, vice-pres. and sec.; C. H. Spriggs, treas. Organized June, 1909, under laws of Utah, capitalization \$25,000, shares 5 cts. par, assessable. Lands, 9 claims, unpatented, show copper and lead ores. Levied an assessment of one-half cent, early 1911, to pay indebtedness incurred through litigation. No returns secured.

OXFORD COPPER MINING CO.**IDAHO**

Idle. Office: Moscow, Idaho. Mine address: Pierce, Clearwater Co., Idaho. E. N. Brown, pres.; H. K. Moore, sec. and supt. Organized Jan. 5, 1907, under laws of Idaho, capitalization \$1,000,000, shares \$1 par. Annual meeting, first Monday in January.

Lands, 11 claims, unpatented, with 200 acres of timber lands, 42 miles from a railway, in the Pierce City district. Property shows porphyritic, igneous rocks carrying 4 veins. The 1 under development, estimated by management as 12' in width, carries oxidized ores to depth of 90', succeeded

by chalcopyrite and bornite, estimated to average 10% copper, 21 oz. silver and \$2 to \$12 gold per ton. Development is by shafts of 27' and 100', with tunnels of 98' and 75'. Equipment includes a 30-h. p. steam plant, with a 20-h. p. hoist, also several mine buildings. No returns for 1913 secured.

OXIDE COPPER CO.**ARIZONA**

Office: 85 Ames Bldg., Boston, Mass. Mine office: Red Rock, Pinal Co., Ariz. Frank H. Higgins, superintendent.

Lands, 31 claims, patented, known as the Copper Prince group, in the Silver Bell district, 7 miles south of the Imperial mine. Property shows contact metamorphic deposits carrying argentiferous copper sulphides in limestone gangue. Development is by a 500' shaft and a 350' tunnel, with about one-half mile of workings. Equipment includes gasoline power and an air compressor. Churn drilling was done, 1910, in the effort to locate disseminated ores, but apparently results were not especially encouraging. Production was 49,676 lbs. copper and 103 oz. silver in 1908, and less than \$3,750 worth of ore in 1910. No recent production secured.

OZARK SMELTING & MINING CO.**KANSAS & NEW MEXICO**

Office: 601 Canal Road, Cleveland, Ohio. Mine office: Magdalena, Socorro Co., N. M. Philip Argall & Sons, of Denver, Colo., cons. engrs. Works office: Coffeyville, Montgomery Co., Kans. Geo. A. Martin, gen. mgr.; Jos. C. Brown, supt.; C. H. Brown, mill supt.; R. V. Brown, smelter supt.; R. P. Pressler, engr. The company is a subsidiary of the Sherwin-Williams Paint Co.

Company owns the Graphic mine, a zinc-lead-copper property comprising 30 claims, 227 acres, with total holdings of 800 acres, in the Magdalena district, showing limestone, shale and quartz, carrying contact ore deposits between limestone and schist, of about 50' proven width, 500' length, and known depth of 500'. An average of 280,000 lbs. is said to show 2% copper, 12.8% lead and 23% zinc, with small gold and silver values. The upper workings show large quantities of lead and zinc carbonates, ores being mainly smithsonite and sphalerite, with some cerussite and argentiferous galena, and occasional cuprite and native copper. Ores are mainly low in grade, with principal values in zinc. The ore shoot, of about 500' length on the 7th, 8th and 9th levels, is about 100' wide on the 9th level. Development is by a 300' shaft, and two 1,500' cross-cut tunnels, with about 8 miles of workings, the lower levels showing a slightly argentiferous sulphide complex of zinc, lead and copper. Property regarded as one of the largest zinc deposits of America.

A new mill was erected, 1912, to treat the large tonnage of low-grade complex zinc-lead-iron sulphide ore already developed, by the froth flotation process, using it as an adjunct to older methods of concentration. Equipment includes electric power and an air compressor. A 50-ton mill, completed 1910, does dry concentration on ores above 20-mesh, and wet concentration on ores below that size. Production, mainly zinc ore, is shipped to the works at Coffeyville, for the manufacture of lead and zinc oxides, as the base for pigments, of which the Sherwin-Williams Co., in control of this corporation, is one of the largest American manufacturers.

PACIFIC COPPER CO.**MICHIGAN**

Office: 701 Sears Bldg., Boston, Mass. Mine office: Leopold Bldg., Houghton, Houghton Co., Mich. Geo. P. Gardner, pres.; Chas. J. Paine, Jr., sec.-treas.; preceding officers, Samuel N. Brown, N. H. Stone, J. Henry Brooks, Walter Hunnewell and R. R. Goodell, directors; Frederick W. Nichols, agt. Organized Aug., 1890, under laws of Michigan, capitalization \$1,250,000, shares \$25 par; issued, \$1,000,000, \$2 paid. Is controlled, through ownership of about one-half of the total stock issue by St. Mary's Mineral Land Co. Paid a

\$1 dividend Nov. 18, 1910. Ended 1912 with \$25,615.24 cash on hand. Company also holds 4,155 shares of stock of the Naumkeag Copper Co., received in part payment for lands sold to that company in 1912.

Lands, 820 acres, being the N. W. $\frac{1}{4}$ and the S. W. diagonal half of the S. W. $\frac{1}{4}$ of the N. E. $\frac{1}{4}$ of Sec. 4, and Sec. 5, T. 54 N., R. 34 W. Property lies just N. W. of the Atlantic mine, and supposedly carries the northern extension of the Atlantic ashbed, on which a little exploratory work was done previous to organization, and the company expended \$19,390 on development work shortly after organization. Has done no mining work since 1890.

PACIFIC COPPER CO., LTD.

MEXICO

Office: Primera San Francisco No. 1, Mexico, D. F. Mine office: Petatlán, Galena, Guerrero, Mex. Dr. W. S. Cockrell, pres.; Thos. Milan, vice-pres.; Carlos Eisenmann, second vice-pres.; J. P. Taylor, sec.; H. J. Morden, treas.; F. C. Stephens, gen. mgr.; Arthur H. Bromly, supt. Organized May 16, 1906, under laws of Mexico, capitalization 10,000,000 pesos, shares 100 pesos par, nonassessable; fully issued. Company holds direct title to its property through the Compañía de Cobre del Pacifico, and is in turn controlled through stock ownership by the Pacific Copper & Pyrites Co.

Lands, 1,000 pertenencias, 2,471 acres, known as El Rey del Cobre group, near the Rio Murga, in La Unión district, 10 miles north of Petatlán and about 28 miles N. E. of Zihuatanejo, the nearest port. The property shows fissure deposits in metamorphic schist, the main lode having a N.-E. strike, traceable 3 miles, and reported by management to be of 197' average width and to hold lenses of cupriferous pyrite. The vein has a gossan, covered mainly by soil, and is proven to depth of 60', at 2 points 900' below the highest outcrop, by stream erosions. Ore is estimated by the management to average 2.5 to 3% copper, 3 to 5 oz. silver and \$1.50 to \$2 gold per ton, with 48 to 50% sulphur and 42% iron.

Development is by "A" shaft of 109', "B" shaft of 70', the "102" shaft of 104' and by El Socavón drift tunnel of 400', No. 3 crosscut tunnel of 404', No. 4 crosscut tunnel of 486', No. 5 tunnel of 243', and No. 1 tunnel of 407', with a total of 2,800' of workings. The management reports that all working faces are in solid ore.

Equipment includes a hoist, not installed, good for 1,000' depth, and a small air compressor. There are about 35 buildings. Property lies in a very rugged country and is reached only by trails.

The property has been under development several years and is said to have employed about 350 men, 1907, but was idle from May until Nov. 20, 1910, when work was resumed with a force of about 65 men. Development work continues without interruption from the warring factions in the present revolution, and the company was planning to begin production, late 1913. The mine, though of low grade, apparently contains large orebodies and is considered promising.

PACIFIC COPPER MINING CO.

ARIZONA

Office: 415 Board of Trade, Kansas City, Mo. Mine office: Crown King, Yavapai Co., Ariz. John Kelley, pres.; W. J. Morse, sec., at last accounts; W. V. DeCamp, gen. mgr. Organized Feb. 8, 1907, under laws of Arizona, capitalization \$3,000,000, shares \$1 par, nonassessable; issued, \$2,397,616.67.

Lands 30 claims, 10 patented, 600 acres, including a mill and smelter site, 4 miles from Harrington and 9 miles from a railway, in the Silver Mountain district of the Bradshaw mountains. The property shows a hornblende phase of Yavapai schist, with an intrusive porphyry dike of 50 to 150' width, carrying 3 contact deposits, No. 1 of 9', No. 2 of 14' and No. 3

of 25' estimated average width, traceable 3,000', with N.-E. strike. Gossans of 100 to 500' estimated width are much leached, carrying honeycombed hematite and limonite, with occasional copper carbonates. Ores are malachite and azurite at and near surface, succeeded at depth of about 50' by a secondary sulphide zone carrying chalcocite, bornite and chalcopyrite. The management estimates ore to range 3 to 15%, and occasionally up to 30%, in copper tenor, up to 240 oz. silver, and 0.2 to 2 oz. gold per ton. Development is by shafts of 450', 40', 60' and 40', and tunnels of 25' and 100', with about 1,500' of workings.

Equipment includes a 120-h. p. plant, with an 80-h. p. 3-cycle vertical engine, connected to a 4-drill Sullivan air compressor, a 20-kw. triplex pump, and a 40-h. p. gasoline hoist. Buildings include a machine shop, smithy and carpenter shop, with boarding house and bunkhouse for 60 men.

PACIFIC COPPER MINING & MILLING CO. WASHINGTON

Office: Chewelah, Stevens Co., Wash. J. G. Olson, pres.; J. A. Hosea, sec.-treas.; Millard S. Hosea, mgr.

Lands, 12 claims, in the Chewelah district, 4 miles west of Blue creek, show Paleozoic sediments cut by diorite and other basic intrusives.

Development is by a 50' shaft and a tunnel, showing silver copper ore, said to run about \$33 per ton.

Equipment includes a 25-h. p. gasoline engine, and 2-drill air compressor. Was developing with small force at last accounts.

PACIFIC COPPER PYRITES CO. MEXICO

Office: 1430 Monadnock Blk., Chicago. John Howard McElroy, pres.; C. B. Greenleaf, sec.; Eugene Atkins, treas. Organized 1912, under laws of Maine, capitalization \$7,500,000, shares \$50 par. Is a securities-holding company, controlling the Pacific Copper Co. through ownership of about one-half of that company's outstanding share capital.

PACIFIC MINES CORPORATION. CALIFORNIA

Office: 1219 Hollingsworth Bldg., Los Angeles, Cal. Mine office: Stagg, San Bernardino Co., Cal. Frank A. Keith, pres. and gen. mgr.; J. N. Beckley, vice-pres.; R. I. Rogers, sec.-treas.; preceding officers, Josiah Austin, Benj. E. Chase, J. H. Hobbs, and S. W. Mudd, directors; E. C. Small, supt.; Geo. Nordenhall, engr.; E. C. Bierce, chemist-assayer.

Organized Oct. 7, 1910, under laws of New York, capitalization \$1,000,000, shares \$5 par; issued, 128,400 shares. Has paid total dividends of \$205,440, of which amount \$154,080 was paid in 1912. Annual meeting, first Tuesday in October. The company is a consolidation of the Bagdad Chase Gold Mining Co. and the Roosevelt Mining & Milling Co.

Lands, 37 claims, patented, 683 acres, in the Bullion Mountain district. Country rock is trachyte-porphry and quartz-monzonite. Orebodies occur in a silicified breccia along an E.-W. fault line, and have an average dip of about 35° N.

There are several known orebodies, the one now under development showing an average width of 10', with a proven length of 800' and developed to 450' depth. Ores carry malachite and oxides with a little chalcocite, and average 1% copper and \$6 gold per ton.

Development is by 10 shafts, ranging from 67 to 465' in depth, and 5 tunnels, longest 950', with about 8,660' of workings, blocking out 50,000 tons for stoping.

Power equipment amounting to 200 h. p. includes an 85-h. p. Union gas engine, 3 hoists and a 10-drill air compressor. Company also owns the Ludlow and Southern standard-gauge railroad, 7½ miles in length, with 2 locomotives.

Buildings include a 40x50' machine shop, a 20x20' smithy, both built of

corrugated iron, an 18x20' carpenter shop, a store building and about 25 other structures.

Production for 1912 was 1,833,626 lbs. fine copper from 39,605 tons dry ore, averaging 2.16% copper. Total production of mine to end of 1912 is 2,455,445 lbs. fine copper.

PACIFIC SMELTING & MINING CO.

MEXICO

Office: 42 Broadway, New York. Mine and smelter office: Fundicion, Sonora, Mex. Melbert B. Cary, pres.; Geo. M. Ryall, vice-pres.; Nelson S. Haughwout, sec.-treas.; preceding officers, Ronald E. Curtis, Howard McWilliams and Charles E. Wetmore, directors; Thornton C. Kirkland, asst. gen. mgr.; Edw. Sweeney, mine supt.; Walter Harvey Weed, cons. geologist.

Organized Oct. 6, 1909, under laws of Maine, capitalization \$8,000,000, shares \$5 par, in \$2,000,000 cumulative 7% preferred stock and \$6,000,000 common stock; all issued. United States Corporation Co., New York, registrar. Annual meeting, third Monday in January, at Augusta, Maine.

General balance sheet of Dec. 31, 1912, shows property and securities, \$8,409,848; furniture, etc., \$1,976, and cash and accounts receivable, \$161,279, last items showing \$29,000 reduction, the others identical with 1911 statement. Liabilities are given as \$8,000,000 for stock, \$222,052 accounts payable, compared with \$188,684 in 1911, and \$351,051 surplus compared with \$413,933 in 1911.

Company controls the Douglas Copper Co. and Mexican Exploration & Mining Co. by ownership of 98% of the capital of each company. These constituent companies hold practically the whole of the capital of 3 other Mexican companies. The subsidiary Mexican corporations are the Anita Mines Co., Yaqui Mining Co. and the following smelting companies: Compania Metalurgica y Refinadora del Pacifico, S. A., owning the Fundicion smelter; the Mexican American Smelting & Refining Co., S. A., owning the Guaymas smelter and the Sinaloa Smelting Co., holding the Mazatlan, or Sinaloa, smelter concession.

The Anita Copper Mines Co., S. A., owns the Anita, Consolidated, Baroyeca, London, Julia and Maria claims, 330 acres, belonging to the Anita mine, 25 miles north of the Fundicion smelter and the station of that name on the Southern Pacific Railroad of Mexico. This mine has been developed to a depth of 900' on the dip of the vein and shows ore reserves above the 7th level, amounting to 55,000 tons, that average \$2.58 gold, \$1.17 in silver and 3.99% copper.

The Anita (or El Cobre mine), has a shear zone of 115' width, with a diorite foot and trachyte, or rhyolite hanging wall. The shear zone, traceable for several thousand feet, with N.-S. strike and dip of about 45° W., carries ore in 5 lenses, or chimneys, the principal one being opened from the surface down to the 8th level, branching into 2 parts at the 6th level. Faulting, cross-faulting and brecciation occur with displacements up to 200'. The ore is partly metasomatic replacement of diorite, and partly a contact metamorphic deposit. It contains the usual oxide minerals succeeded in depth by chalcopyrite. The former management claimed average assays of 6.2% copper, 3.4 oz. silver and \$4.60 gold per ton, which later sampling proved to be too high.

Development consists of a 900' inclined main shaft, No. 1, equal to 500' vertical depth, with 9 levels opened; it had 7,415' of workings in 1907, with little later work. There are also 4 other shafts. The management plans further work as soon as enough basic custom ore is available to supply a suitable furnace mixture. Courtenay de Kalb reported that his examination showed about 55,000 tons of ore blocked out, with good indications for development of further orebodies.

The surface equipment consists of 2 cross-compound 2-stage Rand compressors of 3,000-cu. ft. combined capacity; a Risdon second-motion duplex hoist 14x21"; three 150-h. p. boilers; generator for light and power; rock-crushers, picking tables, shops, assay office, office buildings, warehouses, dwellings, supplies, etc.

El Cobre ranch owned by the company has approximately 10,000 acres of wood and timber land.

The Pirita mine, of the Anita Copper Mines Co., embraces Pirita No. 2 and Pirita No. 3 claims, 81 acres, located 5 to 7 miles from Victoria station on the Southern Pacific Railroad of Mexico. The mines contain a considerable tonnage of pyritic ore having small values in gold, silver and copper, but the deposit has not been extensively developed on account of poor transportation, though in time it will become of value to the company for fluxing purposes.

The Yaqui Mining Co., S. A., owns 10 mining properties in Mexico, which are as yet but partly developed. The Rosamond and Aurora mines each have about 800' of development work, exposing a fair tonnage of commercial copper-silver ore. The company also owns a number of slightly-developed prospects and some old mines nearby.

The Compania Metalurgica y Refinadora del Pacifico, S. A., owns the Fundicion smelter and other properties. The smelter was built originally to treat the ores of the Anita mine and to do general custom business. The smelting plant has a capacity of 350 tons a day, but was designed and in part equipped for 3 times that amount. The plant has one 42x160" blast furnace, sampling mill, power house, shops, administration buildings, etc. A railway connects all departments. The flue and stack equipment are adequate for 2 more furnaces. Electric plant furnishes current for both lighting and power purposes, and all machinery excepting yard locomotives is motor driven. The plant is of modern design and in excellent condition.

The mine is 23 miles from a railway, hence ore is hauled to the smelter by Saurer motor trucks. The road is good for 18 miles and bad for 5 miles, frequently muddy, with grades up to 12%.

The sampling mill is provided with crusher, 2 sets of rolls, 2 Vezin automatic samplers, finishing grinders, electric dryer, etc. The sample, consisting of one-eighth of a shipment received, is brought to the mill in 4-ton steel hopper-bottomed cars and is dumped into crusher bin.

Ore is dumped into a hopper, forming the boot of 2 inclined Jeffrey roller-bearing conveyors, having a capacity of 30 tons hourly, discharging into steel bins on either side of the furnace, and from the bins the charge is run in buggies to the furnace.

A steel dowlake from the blast furnace connects with a balloon dust flue 11x14x172' in size, leading to a 177' self-supporting steel smokestack, 14' in diameter at the base and 8' at the top, standing on a 27' stone foundation. Cars running underneath the flue collect flue dust, which, with fines, go to a pug-mill, which mixes flue dust and concentrates with quicklime and water, pugging them to a stiff sludge, which is fed direct to the furnaces without drying or briquetting. The former management planned installing a converter when required.

The smelter power plant has three 150-h. p. Morrison boilers, a 13x20x12" Bates high-speed compound engine, direct-connected to a 75-kw. Western Electric generator of 500 volts for power purposes; there is also a 25-kw. Western Electric generator direct-connected to a 9x12" engine furnishing current for lighting purposes at 110 volts. Blast is furnished by a Connersville blower direct-connected to a 12x24x36" Bates-Corliss tandem-compound condensing engine. There are 3 electric and 1 steam centrifugal

pumps so connected as to work singly or in series for any purpose, also a condenser, cooling tower, etc.

The smelter plant includes a smithy, machine shop, and an iron foundry with a 30" cupola. The works are served by a 36" gauge railway, equipped with 2 Davenport engines, about 50 four-ton steel ore cars, three 10-ton coke cars and six 40-cu. ft. slag cars, track scales, etc. Water is secured from an artesian well.

Costs have been estimated at \$3.99 per ton for mining, \$2.21 for transportation, \$2.48 for smelting, with indirect costs of \$2.88 per ton, giving a total of \$9.65 per ton with refining, marketing and taxes of \$6.08, or a total cost of \$15.73 per ton.

The town and smelter site consists of 71 acres on which there are 59 American-type dwelling cottages, besides a 2-story hotel, store, school house, electric lighting and water service.

The L'Aime lime quarry, located 2 miles from the railway near Victoria station, has 75 acres of limestone forming a hill 250' high, 300' wide and approximately 3,000' long. The rock is an excellent smelting flux, averaging but 1.2% silica, with about \$1 in gold; it was because of this gold content, determined by a special Government commission, that the company secured it as mineral land.

The Fundición smelter was in blast for 9½ days in May, 1908, treating 300-tons charge daily, but owing to tap jacket troubles, about 15% of the value of the tonnage smelted was tied up in cleaning. As a result of this run, 3 carloads of matte, amounting to 73.5 tons, were shipped to the Nichols Copper Co. for refining. The shipment contained, as per report, 27,868 oz. silver, 172.2 oz. gold and 67,993 lbs. of copper and returned a net value of \$26,869.12. The prices realized were 52⅞ cts. per oz. for silver, \$20.50 per oz. for gold and 12⅞ cts. per lb. for copper. Mr. W. B. Budrow, who was the smelter superintendent at the time, and who had been connected in a similar capacity with several of the Guggenheim smelters, referring to the operation of the furnace, stated. "The performance of the furnace during this operation was very satisfactory, both from a metallurgical and economical point of view. The matte produced was clean and averaged over 46% copper, and notwithstanding the fact that it carried high values in both silver and gold, the slag losses in those metals were quite low."

The Mexican-American Smelting & Refining Co., S. A., owns the Guaymas smelter with 250 acres, at Batuecas, a suburb of Guaymas, on tide water, lying between the Bay of Guaymas and the Southern Pacific Railroad of Mexico. The plant was originally erected by William C. Greene, founder of the Greene-Cananea Copper Co., and not having been operated for some years will need extensive alterations.

This smelting company also owns a concession from the Government covering the smelting rights in the Hermosillo and Guaymas districts of Sonora for a period of 20 years. This concession is a valuable one by reason of its privileges and exemptions.

The Sinaloa Smelting & Refining Co., S. A., owns a concession from the Government for a smelter at Mazatlan, or elsewhere in the state, for a period of 20 years from the 27th day of April, 1906, and is particularly exclusive in its terms.

**PACIFICO, S. A.; CIA METALLURGICA y
REFINADORA DEL.**

MEXICO

Office and works: Fundición, Sonora, Mex. Organized 1907. Is controlled through ownership of 99% of stock by the Douglas Copper Co., which is to be liquidated and assets taken over by the Pacific Smelting & Mining Co., which see.

PAHAQUARRY COPPER CO.**NEW JERSEY**

Geo. P. Young, receiver, Belvidere, Warren Co., N. J. O. R. Deshler, pres.; H. D. Deshler, sec.; Geo. O. Deshler, supt. Organized under laws of New Jersey, capitalization \$500,000, shares \$1 par.

The company has been operating the Pahaquarry mine since 1909 or 1910. The returns have been small and a floating debt of about \$110,000 was accumulated. In Oct., 1913, on application of some of the creditors, I. N. Beavers, of Reading Penn., and George P. Young, of Belvidere, N. J., were appointed receivers for the company. At a meeting of the stockholders a proposal to assess the stock 20% was voted down. The stock is owned in Northampton and Lehigh counties, Pennsylvania, and in Warren county, New Jersey. The mine has been worked at intervals for many years by different companies.

Lands, 1,642 acres, freehold, well timbered, in Pahaquarry township, on the northwestern slope of the Blue Ridge mountains, include a stone quarry, at Calno, N. J. The mine is said to have been worked by the Dutch as early as A. D. 1660, and was worked, 1847-62, by the Allegheny Mining Co., which secured an average copper extraction of better than 3%. The ore deposit of 287' claimed width, is traceable about 3½ miles on company's lands, by strong outcrops. It consists of white and gray well-bedded sandstones, speckled with grains of copper glance, or its decomposition products, and carries shoots and local enrichments of high-grade ore. The mine is developed by a 1,000' tunnel.

A 200-ton concentrator, completed 1910, after several years construction, is said to have 2 sets of 16x30" Standard rolls, 4 sets of 10x30" Standard rolls and 32 impact screens, and is operated by electric power.

The property, though low in grade, has an orebody of large size and is by no means devoid of promise, but will require large capital and skilled technical handling to be successful.

PAHREAH CONSOLIDATED COPPER CO.**UTAH**

Idle. Mine address: Pahreah, Kane Co., Utah. Heber W. Hartley, pres.; J. L. Perkes, sec.-treas., at last accounts.

Property, 12 claims, 150 miles from a railroad, shows a sandstone reef, dipping at an angle of 40°, underlaid by porphyry and limestone. The ore occurs mainly in the sandstone. Mine is developed by several open cuts and a short tunnel with considerable work done in the way of drifts and winzes, showing silver and gold-bearing copper ore of good grade. The vein is about 12' wide.

PALO VERDE COPPER CO.**ARIZONA**

Property is a copper prospect about 40 miles west of Phoenix, in the Saddleback mountains, between White Tanks and Eagle Tails districts. C. H. Howland, Cuyahoga Falls, Ohio, manager.

Mine is opened by shafts of 50', 112' and 120', and a 130' tunnel, said to show an orebody 600' wide, carrying copper-cobalt ores, assaying up to 20.92% copper and a 4.5% cobalt.

PAN-AMERICAN MG. & SM. CO.**ARIZONA & MEXICO**

Letter unclaimed at former office: 11 Broadway, New York. Mine office: Prescott, Yavapai Co., Ariz. A. Howard Skinner, pres.; Harry F. Lindsley, sec.-treas., at last accounts. Organized under laws of Arizona, capitalization \$15,000,000, shares \$5 par, in 3,000,000 preferred 7% stock and \$12,000,000 common stock. For further details, see Vol. X.

PANDORA COPPER MINING CO., LTD.**IDAHO**

Office: Wallace, Idaho. Mine office: Larson, Shoshone Co., Idaho. Walter H. Hanson, pres.; Martin Dunn, vice-pres.; John C. Weatherhead, sec.-treas. and gen. mgr.; preceding officers, John P. Gray and C. M. Baillie,

directors. Organized Oct., 1906, under laws of Idaho, capitalization \$1,000,000, shares \$1 par, fully paid; issued, \$737,000. Annual meeting, fourth Wednesday in October.

Lands, 10 claims, 150 acres, adjoining the Snowstorm mine on the east, and supposed to carry about 3,000' of the Snowstorm ore zone. Property shows St. Regis and Revett quartzites, with copper impregnations in the latter. Development is by the 1,400' main, or working tunnel, which has not yet crosscut the vein, and by other workings.

PAPOGO CHIEF MINE.

ARIZONA

Grigalvo & Amado, owners, Amadoville, Santa Cruz Co., Ariz. Property, in the Baboquivari mountains, has developed a copper deposit by 100' shaft and tunnels. Equipment includes steam hoist. Small shipments were being made Sept., 1913, of very high-grade gold-copper ore.

PARADISE MINING CO.

ARIZONA

At Paradise, Cochise Co., Ariz. Is controlled through ownership of 60% of stock, by Bisbee-Sonora Development Co., and property is described under that title.

PARADOX MINING & MILLING CO.

COLORADO

Office: Grand Junction, Colo. Mine office: Paradox, Montrose Co., Colo. J. A. McCulloch, pres.; T. W. James, vice-pres.; A. A. Miller, sec. and gen. mgr.; D. T. Stone, treas. Organized Jan. 25, 1905, under laws of Colorado, capitalization \$1,500,000, shares \$1 par.

Lands, 12 claims, 110 acres, and a 5-acre mill site, in the La Sal and Paradox districts, 65 miles from a railroad, showing limestone, sandstone, shales and quartzite, cut by intrusive porphyry. The claims show 3 contact veins of 2 to 7' width, opened by tunnels of 85', 100', 200' and 400', exposing melaconite and argentite ores, giving assay values of 3 to 75% copper and 1 to 1,000 oz. silver per ton, with a trace of gold. Idle several years.

PARCIONERA CONSOLIDATED MINING CO.

MEXICO

Address: Jos. S. Qualey, pres., 25 Pine St., New York city. Mine office: Santa Eulalia, Chihuahua, Mex. Ernest Henderson, sec. Is a close corporation, shares \$100 par. Property, a silver-lead mine, was said, at last accounts, to give an encouraging showing of copper.

PARIS BOULDER MINING CO.

IDAHO

Office and mine: Paris, Bear Lake Co., Idaho. Andrew Madsen, pres.; J. H. Eversoll, sec.-treas.; L. W. Johnson, supt., at last accounts. Organized May, 1908, under laws of Idaho, capitalization \$50,000, shares 5 cts. par. Lands, 30 claims, 6 miles west of Paris, developed by a 200' tunnel, showing silver-lead and copper ores, with values principally in lead.

PARK COPPER & GOLD MINING CO., LTD.

IDAHO

Idle. Office: 616 Cedar St., Wallace, Idaho. Mine office: Mullan, Shoshone Co., Idaho. T. N. Barnard, pres. and mgr.; Nellie J. Stockbridge, sec. Capitalization \$1,500,000, shares \$1 par. Lands, 7 claims, on the southern side of Stevens peak, 5 miles from a railway. The property is said to have a fissure vein in quartzite, of about 60' in average width, capped by a 40' gossan of mixed hematite and siderite, carrying kidneys of high-grade copper carbonates and chalcopryrite, with occasional native copper. Development is by two 25' shafts and 3 tunnels, the two upper tunnels showing ore, while No. 3, the lower tunnel, of 1,680' length, with a back of about 1,000', shows no ore. The mine has about one-half mile of workings. Inactive for several years.

PARRAL; CIA. ESPLORADORA DE.

MEXICO

Property is the Lentisco mine, near San Bartolo, Durango, Mex. Idle several years.

PARROT SILVER & COPPER CO.**MONTANA**

Is controlled by Anaconda Copper Mining Co., 42 Broadway, New York. A. H. Melin, pres.; D. B. Hennessy, vice-pres.; H. I. Meehan, sec.-treas.; preceding officers, John D. Ryan, Sidney Chase, B. B. Thayer and C. F. Kelley, directors. Organized, 1880, under laws of Montana, capitalization \$2,300,000, shares \$10 par; issued \$2,298,500. Pays a regular quarterly dividend of 15 cts. a share.

The entire property of the company was sold, 1910, to the Anaconda Copper Mining Co., for 90,000 shares of Anaconda stock, which now constitutes the company's sole asset.

In Jan., 1911, a suit was brought by Wm. E. Wall and other minority stockholders of Boston, Mass., representing 1,210 shares, to set aside this sale, as due to an unlawful conspiracy whereby true values were concealed, no appraisals made and the rights and interests of the minority violated.

The testimony at Boston and Butte, Oct., 1912, disclosed that the deal was carried through without an outside appraisal, but whether price paid was adequate or not is for the court to determine, and the allegations concerning violation of the Sherman act appear to be introduced merely to strengthen the appearance of illegal action. When this litigation is settled the company is to be wound up and assets distributed, pro rata, to shareholders.

PARRY SOUND COPPER MINING CO., LTD.**ONTARIO**

Office: 500 Germania Life Bldg., St. Paul, Minn. Mine office: Parry Sound, Parry Sound district, Ont. Frank Johnson, pres.; Otto Monson, sec.-treas.; preceding officers, John Ogren, A. Linderholm, and F. X. Benning, directors; Chas. Anderson, supt. Organized March 23, 1899, under laws of Ontario, capitalization \$5,000,000, shares \$1 par; issued, \$4,500,000. Liabilities are given at \$45,000 floating indebtedness, and a \$3,000 mortgage at 6% on 200 acres of land. Annual meeting, second Tuesday in August.

Lands, 10 claims, 1,000 acres, one-half freehold and one-fifth held subject to a \$3,000 mortgage, on the eastern shore of Georgian bay, property including the McGowan and Wilcox mines.

The Wilcox mine has outcroppings of 4 parallel veins in a width of about a quarter mile, with a 145' shaft on a 20' vein in granite-gneiss, traceable 1,000', carrying auriferous and argentiferous bornite, assaying 2.8 to 11% copper. There also is an open-cut of 20x150' area, 18' deep, showing 3% chalcopryite.

The McGowan mine has shafts of 100', 100' and 250', and a 150' crosscut tunnel, showing bornite and occasional chalcopryite, with quartz gangue. A smelter shipment of 240 tons of selected ore returned 17% copper and \$5 per ton in combined gold and silver values.

Equipment includes a 10-stamp mill, hoisting machinery and several buildings. Idle at end of year, but management plans further work.

PATAGONIA MINES & DEVELOPMENT CO.**ARIZONA**

Office: Patagonia, Santa Cruz Co., Ariz. Thos. Ewing, pres. and gen. mgr.; John A. Campbell, sec.-treas.; D. W. R. Davis and Charles Wighard, directors. Capitalization \$1,000,000, shares \$1 par.

Lands, sundry claims, including the Wolf-ton and Producer in Josephine canyon, Patagonia, the Oklahoma group of 8 claims and the Blue Rock claims, about 2 miles S. W., and the San Antonio mine, in the Sierra Azul mountains, 30 miles S. W. of Cananea.

Development, on the Wolf-ton and Producer claims, consists of a 150' tunnel, showing silver-copper and lead ores.

PAWNEE MINING CO.**ARIZONA**

Office: Douglas, Ariz. Mine office: San Simon, Cochise Co., Ariz.

Byron W. Claire, pres.; Henry D. Tinker, vice-pres.; Jas. A. Combs, sec.-treas. Organized, 1909, capitalization \$1,000,000, shares \$1 par.

Lands, 5 claims, 100 acres, known as the Claire or Empire State mine, 3 miles from the King of Lead mine and 17 miles from San Simon. Property was worked 1879, and later by the Lone Butte Mining Co., ore being treated in an arrastre, but the ore became base at shallow depth. Development is by shafts of 60' and 100', latter connected with an 80' tunnel. Presumably idle.

PAY CAR MINES CO.

ARIZONA

Office and mine: Bouse, Yuma Co., Ariz. J. C. Denton, pres. and gen. mgr.; Geo. D. Christy, vice-pres.; H. P. Ward, sec.; E. L. Short, treas., and Russ Avery, directors. Organized, 1909.

Lands, 53 claims about 1,000 acres, 3 to 5 miles west of Bouse, in the northern end of the Plomosa district. Property includes the Pay Car, Free Gold, Sunshine and Midnight groups, latter having shipped a little high-grade gold ore and shows sedimentary schist, shale and limestone, invaded by intrusions of diorite and andesite, ore following the course of the eruptives. Orebodies, mainly hematite, carry stringers giving assays of 2 to 20% copper and \$2 to \$250 gold per ton. Development is by a 210' vertical main shaft. Equipment includes a 20-h. p. gasoline hoist. The Pay Car group was in the hands of leasers and a little high-grade ore was being shipped, at last accounts. Is not a promising property.

PAYMASTER MINE.

IDAHO

Idle. Property, 1 mile east of Wardner, Shoshone Co., Idaho, is said to have a 4' vein carrying lead and copper values. The mine has a 280' upper tunnel and a 100' lower tunnel, with a 100' blind shaft, from the lower tunnel, showing good lead and copper ore, former assaying up to 42% in tenor.

PEABODY COPPER MINING CO.

ARIZONA

Mine office: Johnson, Cochise Co., Ariz. Property, 12 claims, 230 acres, bought of the Bonanza Belt Copper Co., include the Peabody mine, located 1879, which has a 6' vein carrying ore giving assays up to 9% copper and 4 oz. silver, and is popularly credited with having produced about \$2,000,000 worth of ore, under former ownership. Work 1912-13 was confined to mining carbonate ores. The mine is about 300' deep.

PEACH MINE.

ARIZONA

Address: General Development Co., owner, 42 Broadway, New York. Fred Butts, superintendent. Shows replacement deposit of copper ore in limestone, developed by 200' shaft and 300' tunnel. Is equipped with gasoline hoist. Shipments made 1912.

PEACOCK COPPER CONSOLIDATED CO.

UTAH

Idle. Letter unclaimed at former mine office, Milford, Beaver Co., Utah. L. F. Block, pres., treas. and gen. mgr.; J. Block, sec., at last accounts. Organized 1906, under laws of Utah, capitalization \$60,000, reduced from \$600,000, Nov. 12, 1913, shares 10 cts. par, assessable.

Lands, 4 claims, patented, lie west of the Hornsilver mine and adjoin the King David and Cupric mines in the San Francisco district. Property has a good surface showing of argentiferous galena, disseminated in limestone. Mine, opened by a 150' shaft, with 500' of workings, developed a 2 to 5' fissure vein carrying silver-lead and copper ores, assaying up to 42% lead, 23 oz. silver, and \$1.60 gold per ton.

PEACOCK COPPER MINING CO.

ARIZONA

Office: 1 Buckler Bldg., El Paso, Tex. Mine office: Johnson, Cochise Co., Ariz. J. A. Bennett, pres. and gen. mgr.; F. M. Filler, vice-pres.; A. H. Anderson, sec. and treas.; H. L. Marmion, supt. Organized Sept. 4, 1908, under laws of Arizona, capitalization \$1,500,000, shares \$1 par, nonassess-

able; issued, \$808,000. Annual meeting, first Tuesday after first Monday in October.

Lands, 17 claims, unpatented, 330 acres south of the Peacock mine and adjoining the Arizona United Mines Co., show limestone and porphyry, with an ore zone of N.-W. strike, of 40 to 200' width on the outcrop.

Mine is opened by shafts of 110' and 200', and a 160' tunnel, with about 1,030' of workings, showing a 5' vein, said to average 4% copper, 5 oz. silver and about \$1 gold per ton. Buildings include an office, smithy and bunkhouse. Mine made small ore shipments to El Paso, 1912. Management plans continuous development, and installation of a small hoist at No. 2 shaft.

PEACOCK COPPER MINING CO., LTD.

IDAHO

Office: Wallace, Idaho. John H. Nordquist, president. Organized 1907, under laws of Idaho. Lands, 5 claims, near the Eagle Mining Co., in the St. Joe district, Idaho county, Idaho. No returns secured.

PEACOCK MINE.

IDAHO

At Council, Washington Co., Idaho. Owned by American Mining Co., Ltd., S. T. Hauser and A. M. Holter. Described under title American Mining Co., Ltd.

PEARCE MINE.

CALIFORNIA

Mine address: Raymond, Madera Co., Cal. J. B. Pearce, owner. The mine, in the Green Mountain district, several miles from a railway, is developed by a 125' shaft and 400' tunnel, showing sulphide ores, underneath a 60 to 100' gossan; said to carry up to 20% copper. Ore is sacked and hauled by wagon to the railroad at Raymond, at a transportation cost of \$4 per ton.

PECOS COPPER CO.

NEW MEXICO

Idle. Office: The Arcade, Cleveland, Ohio. Mine office: Cowles, San Miguel Co., N. M. Alfred H. Cowles, pres.; I. C. Gifford, vice-pres.; Frederick W. Swan, sec. Organized 1904, under laws of Michigan, capitalization \$100,000, shares \$25 par; fully issued and fully paid. The company has a floating debt of \$65,000, owed to stockholders, of whom there are only 5, the company being a close corporation.

Lands, 15 claims, 268 acres, and 552 acres including valuable coal veins and placer ground, all patented, in the Hamilton district, 12 miles from Santa Fe. Holdings include water rights to the Pecos river for 2½ miles, with 2,000 h. p. available for development.

Lands show granite, slate and quartzite, underlying lower Carboniferous limestones in which the valley of the Pecos river is cut. The property carries a contact deposit, with ferruginous quartzite on the south, and granite to the north, the mineralized zone, ranging up to 225' in width, traced 1,000', carrying orebodies of 12 to 40' width. A brecciated-intrusive diorite follows the vein. Ores contain massive chalcopyrite, sphalerite and occasional galena, said to give average assays of 3.5% copper, 3.75 oz. silver and \$1.60 gold per ton. The ore, being complex, will be difficult of treatment.

Development amounting to 3,600' of work, includes the 60' Katydid shaft and 370' Evangeline shaft, with 450' of tunnels, estimated to show 210,380 tons of ore, blocked out for stoping, of an estimated value of \$3,560,000. The mine, discovered 1881, was worked for a short time only owing to the zinc ores near the surface proving unworkable, and was taken over 1905, by the present company.

Equipment includes a 165-h. p. steam plant, with 2 hoists, 1 good for 600' depth, and a 3-drill Rand air compressor. There are several mine buildings. The company plans building a 23-mile railway, from the mines to Pecos switch, on the Santa Fé line.

PECOS MINING CO.**TEXAS**

Address: Jesse Hittson, Van Horn, Culbertson Co., Texas. J. Hittson, J. Y. Canon, and James Dougherty, all of Van Horn, principal shareholders.

Property, the Pecos mine, 3 miles N. E. of the Hazel silver mine in El Paso county, 19 miles from Van Horn. Claims show a N.E.-S.W. vein in brown igneous tuffs, traceable 2 miles across the mountains to the Red Maverick mine.

Development consists of a 105' shaft with a level at 90', showing seams a few inches thick of copper-silver ore, assaying 70% copper; the seams in places aggregate 2' in thickness. The mine was first operated in 1888, abandoned after working and relocated 1903, by Geo. Briggs and T. R. Owen, forfeited by technicality of Land Commission and located by J. Y. Canon.

PEERLESS MINING & MILLING CO.**COLORADO**

Office and mine: Salida, Chaffee Co., Colo. H. F. Schnelker, pres. and gen. mgr.; I. W. Haight, sec.-treas.; at last accounts. Organized Nov., 1904, under laws of Colorado, capitalization \$500,000, shares \$1 par, nonassessable.

Lands, 6 claims, 70 acres, with 10 acres timbered, on Cyclone mountain, in the Monarch district, 16 miles west of Salida, showing several fissure veins in granite, carrying auriferous and argentiferous lead and copper sulphides, with lead values predominating. The mine has an 800' crosscut tunnel, with 1,350' of workings. There is a bunkhouse, and a 12x14' stampmill, presumably with 1 stamp. Company is slowly extending the tunnel, working summers and doing 150 to 300' of new work annually.

PELICAN MINING & MILLING CORPORATION.**COLORADO**

Office: 141 Milk St., Boston, Mass. Mine office: Lake City, Hinsdale Co., Colo. Chas. F. Willis, general manager, at last accounts. Mine is developed by tunnel and has electric power and air compressor. No returns secured.

PENN MINING CO.**CALIFORNIA**

Office: 901 Foster Bldg., Denver, Colo. Mine and works office: Campo Seco, Calaveras Co., Cal. Chas. Loughridge, pres. and gen. mgr.; Wm. D. McIlvaine, sec.-treas.; Alfred P. Busey, Jr., gen. supt.; D. C. Smith, metallurgist and smelter supt. Organized June 1, 1910, under laws of Wyoming, as successor of Penn Chemical Works, capitalization \$250,000, shares \$1 par. Is operated as a close corporation.

Property, the Campo Seco, Hecla and Satellite mines, near Campo Seco, in the Foothill copper belt, 4 claims, 80 acres, with a 20-acre smelter-site, 640 acres of timber lands and 450 acres miscellaneous lands, giving total holdings of 1,190 acres. The ore deposit, having a maximum width of 30', at depth of 400', lies between amphibolite schist and talcose shale, and north of the Campo Seco shaft splits into veins known as the East and West, which continue parallel. Ore is mainly chalcopyrite, associated with sphalerite, sometimes occurring in considerable quantities, and pyrite, and also includes occasional chalcocite, bornite and covellite. The ore has a maximum value of 7 to 11% copper, 8 to 10 oz. silver and \$3 to \$4.50 gold per ton, but the average is materially lower. The gangue ranges from talcose schist, through clay, to quartz.

Development includes the 1,550' working shaft and 5 tunnels; also 4 other shafts, 3 on the East vein at the Campo Seco and Hecla mines and 1 on the West vein at the Satellite mine. No. 1 shaft, 400' deep, is useful only for ventilation; No. 2 shaft, 750' deep, at the Campo Seco mine, is the main working shaft, with a steam hoist; No. 3 shaft, at the Satellite mine, about 1,300' from No. 2 is 1,150' deep, with levels at 100' intervals, and has a steam hoist; No. 4 shaft, at the Satellite mine, 400' deep, is used as an air shaft and manway; No. 5 shaft, at the Hecla mine, is 400' deep.

Equipment includes a 150-h. p. steam plant at the mine, with 44-h. p. and 100-h. p. hoists, good for 1,000' and 2,000' respectively, and there is a 14-drill Ingersoll-Sergeant air compressor and an electric light plant. The smelter has a 400-h. p. steam and electric plant; fuel is crude petroleum, which also is burned in the locomotives. The Southern Pacific railway is distant 6 miles, at Valley Springs, and transportation between that point and the mine is by wagons, making one round trip daily. A short private railway connects the mines and works.

The 300-ton smelter, a quarter of a mile from the mine, has a 75-ton 36x72" blast furnace and reverberatory furnaces of 50 and 100 tons, latter burning petroleum, and the smaller reverberatory is used to agglomerate partially desulphurized fines. There are eight 16-ton McDougal calciners. The blast furnace, using semi-pyritic smelting, makes mattes of 20%, 40% and 60% copper tenor, in 3 successive fusions, and matte of about the same tenor is made in 1 fusion in the large reverberatory furnace. Matte goes to the American Metal Co., Ltd., for conversion and refining. The smelter railway, for charging and slags, has electric locomotives. A considerable percentage of the pyritic ore is used for the manufacture of sulphuric acid, and a little cement copper is produced by leaching old waste dumps. The smelter has had considerable trouble with farmers over fumes, these difficulties having been adjusted 1908, by the payment of damages, but complaints were again filed early 1912, and after operating throughout 1912 and trying out a new process for the elimination of sulphur from the smelter fumes, the plant was forced to shut down.

PENN-WASH. CONSOLIDATED MINES CO.

WASHINGTON

Office: 409 Malley Bldg., New Haven, Conn. Mine near Conconully, Okanogan Co., Wash. Wm. Baines, pres.; F. J. May, sec.-treas.; David Gubser, gen. mgr., at last accounts. Organized as successor of Washington Consolidated Copper Co., which was a reconstruction of the Washington Tunnel & Copper Co., which was a reorganization of the Mineral Hill Mining Co.

Lands, 48 claims, about 960 acres, in the Mineral Hill district, including the Mineral Hill group of 20 claims, having an 1,800' tunnel, said to cut 3 veins, carrying silver and gold-bearing copper ores, mainly argentiferous tetrahedrite. The 400' main tunnel is planned to be continued to 12,000', to cut 8 known veins, and the mine also has several shallow shafts. There is an available water power, rated as capable of developing 4,000 h. p. Equipment includes a steam plant, crusher, ore bunkers and a sawmill. Idle.

PENN-WYOMING COPPER CO.

WYOMING

Bankrupt. Entire assets of the company consists of stock and mortgage bonds of the Battle Lake Tunnel Site Mining Co., the Haggerty Copper Mining Co., Encampment Smelting Co., Encampment Tramway Co., Encampment Pipe-Line Ditch Co., Encampment Land & Townsite Lot Co., Carbondale Coal Co., Emerson Electric Light Co., Saratoga & Encampment Railroad Co. and North American Mercantile Co. These were sold, March, 1913, by order of Judge John A. Riner of the U. S. district court of Wyoming, to satisfy a trust deed held by the Continental & Commercial Trust & Savings Bank of Chicago. See the United Smelters Railway & Copper Co. which supposedly owned the Penn-Wyoming. The company and its ramifications are very fully described Vol. X.

PENNFIELD MINING CO.

ARIZONA

Controlled by Chesterfield Copper Co. C. E. Horney, secretary, 507 Brown Bros. Bldg., Philadelphia, Pa. Mine near Twin Buttes, Pima Co., Ariz. Property adjoins that of the Chesterfield Copper Co. and ore deposit is similar.

PENNSYLVANIA MINING CO.**COLORADO**

Probably reorganized as Pennsylvania Mining, Power & Reduction Co. and property described thereunder.

PENNSYLVANIA MG., POWER & REDUCTION CO.**COLORADO**

Leopold Sternberger, business manager, Idaho Springs, Clear Creek Co., Colo. Is presumably a reorganization of the Pennsylvania Mining Co. Property, the Pennsylvania group, shows fissure veins with complex lead-zinc-copper ore, opened by shafts and tunnels. Equipment includes steam and water-power plants, air compressors, etc. Mine was operated by leasers at last accounts.

PENOBSCOT MINING CO.**MONTANA**

Mine address: Elkhorn, Beaverhead Co., Mont. J. Bowden, manager. Property is the old Elkhorn and Hecla mines, about 16 miles west of Melrose, showing fissure veins in granite.

Development is by 3 incline shafts, and company was planning 1912, to drive a 3,000' tunnel, at a low level and to install electrical equipment.

PENOLES MINING CO. (CIA. MINERA DE PENOLES).**MEXICO**

Smelting works and mines at Mapimi, Durango, Mex. Controlled by the Metallurgische Gesellschaft of Germany. Capitalization 4,000,000 pesos, increased 1910 from 250,000 pesos, shares 100 pesos par. Owns the Ojuela mine with silver-lead ores in limestone, the San Juan mine (Herman A. Kruger, superintendent, killed by revolutionists in 1913), the Paloma mines and has options on the Cabrillas and Mariposa mines. Company produces merely a little copper as a byproduct.

PEOPLES PARTY MINING CO.**ARIZONA**

Address: care Robt. MacKay, vice-pres. and mgr., Johnson, Cochise Co., Arizona. John Gleeson, pres. Property, adjoining the Bonanza Belt Copper Co. to the south, was operated in 1913, developing a deposit of fair-grade copper ore which is sorted for shipment to El Paso.

PERSON CONS. COPPER & GOLD MINES CO.**NORTH CAROLINA**

Letter unclaimed at former mine office, Virgilina, Halifax Co., Va. E. D. Beecher, pres. and gen. mgr., at last accounts. Organized under laws of New York, capitalization \$1,000,000, shares \$10 par.

Lands, 1,372 acres, in several neighboring tracts, including the Durgy mine, located in Person county, North Carolina, having a 330' main shaft, developing a quartz vein averaging 4' wide in porphyry and other igneous rocks, altered to metamorphic micaceous schists. The vein carries shoots of bornite and glance ore that vary from 4 to 20% copper. Has a 50-ton concentrator. When worked the mine shipped concentrates averaging 45% copper and 20 oz. silver per ton, with small gold values, sending a limited amount of high-grade ore, averaging 30% copper and 10 oz. silver per ton, direct to smelter. Idle several years and company is apparently moribund.

PERTH AMBOY SMELTER.**NEW JERSEY**

Property of American Smelting & Refining Co. at Perth Amboy. Has 600-ton copper-lead smelter, 200-ton lead refinery and a 300-ton electrolytic copper refinery, employing about 2,000 men. Described under American Smelting & Refining Co.

PEYTON CHEMICAL CO.**CALIFORNIA**

Formerly at El Dorado, El Dorado Co., Cal., and Martinez, Contra Costa Co., Cal. Property sold to General Chemical Co. of California, 1911. Described Vol. X.

PHELPS, DODGE & CO., INC.**UNITED STATES & MEXICO**

Office: 99 John St., New York. Dr. Jas. Douglas, pres.; Cleveland H. Dodge, Arthur Curtiss James and Jas. McLean, vice-presidents; Geo. Not-

man, sec.-treas.; preceding officers, Geo. B. Agnew, Francis L. Hine, Wm. Church Osborn and E. Hayward Ferry, directors; Walter Douglas, gen. mgr.; J. Millard Jones, British agent. Organized Dec. 14, 1908, under laws of New York, capitalization \$50,000,000, shares \$100 par; outstanding, Jan. 1, 1913, \$45,000,000. This company was organized as the successor of the firm of Phelps, Dodge & Co., which had a history of nearly a century, its founder, Wm. Earle Dodge, having been one of the great pioneer merchants of America and a noted philanthropist. Shares are listed on the New York Stock Exchange.

Capital stock: Authorized, \$50,000,000; outstanding, \$45,000,000. Shares, \$100. The capital stock was issued for the purchase of the entire stock of the Copper Queen Consolidated Mining Co., at \$135 for each \$10 share, \$27,-000,000; Moctezuma Copper Co., at \$307 9-13 for each \$100 share, \$8,000,000; Detroit Copper Mining Co. of Arizona, at \$150 for each \$25 share, \$6,000,000; Stag Canon Fuel Co., at \$800 for each \$100 share, \$4,000,000; held for future issue \$5,000,000; total, \$50,000,000. Stock listed on New York Stock Exchange. Annual meeting, first Tuesday after first Monday in April, at 99 John St., New York. Books close 10 days before and reopen day after annual meeting. Stock transferred at office of the company. Registrar of stock, Farmers' Loan & Trust Co., New York city.

The company pays a regular quarterly dividend of \$2.50 per share and in 1913, 2 extra dividends of \$2 each per share were paid up to Oct. 1, compared with \$5 extra in 1912 and \$2 extra in the 3 preceding years.

Comparative General Balance Sheet:

	Jan. 31, 1909.	Dec. 31, 1909.	Dec. 31, 1910.	Dec. 31, 1911.	Dec. 31, 1912.
Assets:					
Copper Queen Cons. Mining Co. stock	\$26,934,660	\$26,989,605	\$27,000,000	\$27,000,000	\$27,000,000
Moctezuma Copper Co. stock (26,000 shares)	8,000,000	8,000,000	8,000,000	8,000,000	8,000,000
Detroit Copper Min- ing Co. of Arizo- na, stock	6,000,000	6,000,000	6,000,000	6,000,000	6,000,000
Stag Canon Fuel Co. stock (5,000 shares)	4,000,000	4,000,000	6,500,000	6,500,000	6,500,000
Organization ex- pense	25,000	.....	.....	.....	.....
Burro Mountain Copper Co. stock .....	.....	1,487,640	1,487,640	2,200,000	3,550,000
Phelps Dodge Merc- antile Co. ....	.....	.....	.....	.....	2,000,000
Sundry mining prop- erties .....	.....	.....	.....	.....	237,694
Cash .....	.....	2,114,814	3,818,618	2,692,821	3,500,779
Bills receivable ...	.....	18,862	18,863	.....	.....
Accounts receivable .....	.....	764,739	1,464,173	1,404,637	2,632,771
Bonds owned .....	.....	.....	.....	81,060	.....
Totals	\$44,959,660	\$49,375,660	\$54,289,294	\$53,878,518	\$59,421,244

Liabilities:					
Capital stock.....	\$44,934,660	\$44,989,605	\$45,000,000	\$45,000,000	\$45,000,000
Phelps Dodge & Co. (firm)	25,000				
Due to subsidiary companies and others		3,939,496	5,395,221	3,250,143	5,257,683
Reserve against stocks owned....				1,500,000	3,000,000
Surplus		446,559	3,894,073	4,128,375	6,163,561
Totals	\$44,959,660	\$49,375,660	\$54,289,294	\$53,878,518	\$59,421,244

Comparative Income Account, years ending Dec. 31.

	1912	1911	1910	1909
Dividends from subsidiary com- panies	\$10,005,458	\$6,994,000	\$8,787,815	\$5,769,354
Commissions, miscellaneous earn- ings	406,077	289,509	312,095	256,386
Total earnings.....	10,411,535	7,283,509	9,099,910	6,025,740
Taxes, expenses, etc.....	126,349	149,206	252,521	182,529
Dividends paid.....	6,750,000	5,400,000	5,399,875	5,396,652
Transferred to reserve.....	1,500,000	1,500,000		
Surplus	2,035,186	234,302	3,447,514	446,559

This company also controls through personal holdings of its officers, the Old Dominion Co., Old Dominion Copper Mining & Smelting Co., United Globe Mines and Commercial Mining Co. Members of the old firm also control the El Paso & Southwestern railway, a road that, while built originally as an outlet for the Copper Queen mine, has expanded steadily and bids fair to develop eventually into a transcontinental trunk line. The same interests are very large shareholders in the Rock Island and Great Northern railways.

This company controls some of the richest and most productive copper mines in existence, all blessed with the ability to make copper at unusually low costs, as is evidenced by the great increase in dividends of subsidiaries in 1910 over 1909, in a year when decreased dividends were the rule with a great majority of the large copper producers of the world.

The company also controls the Burro Mountain Copper and Phelps Dodge Mercantile Co.

Comparative statement of total production from subsidiary companies mines. Years ending Dec. 31.

	1912	1911	1910
Total ore extracted, tons.....	1,893,244	1,841,210	1,644,541
Total ore milled, tons.....		1,017,352	
Concentrates produced, tons.....	1,098,528	179,234	
Copper ore smelted, tons.....	1,051,315	930,331	
From company's properties, tons.....	953,741	822,647	787,891
Custom ore, tons.....	97,574	107,684	131,050
Copper, lbs.....	148,678,889	134,149,627	138,805,652
Silver, oz.....	1,689,152	1,794,895	1,395,504
Gold, oz.....	27,687	27,154	20,412

This company also took over the metals selling agency of the old firm, and in addition to marketing the product of its own mines, acts as sales agent for the Calumet & Arizona and other producers.

Comparative statement of copper sales, years ending Dec. 31.

	1912	1911	1910	1909
Total sales of copper, lbs.....	192,297,374	180,301,965	194,138,698	185,033,415
Subsidiary companies, lbs.....	139,759,515	131,327,002	139,297,409	.....
Outside product, on commission, lbs.....	52,537,859	48,974,963	54,841,289	.....
Sold to domestic trade, lbs.....	98,267,037	69,483,782	100,819,254	.....
Sold to foreign trade, lbs.....	94,030,337	110,818,183	93,319,444	.....
Average price per lb.....	15.51 cts.	12.36 cts.	12.826 cts.	.....

The total output of the Phelps-Dodge properties in October totalled 13,332,943 lbs., and there is little doubt that the company will this year reach the 150,000,000 lbs. mark. The production to date in 1913, compared with previous years has been as follows, in pounds:

	1913	1912	1911
Six months.....	74,216,137	70,735,473	66,545,246
July	12,611,837	12,994,253	10,303,823
August	13,971,674	11,270,263	11,349,904
September	13,561,742	11,757,373	10,523,273
October	13,332,943	13,165,070	11,592,485

Ten months.....127,694,333 119,922,432 110,314,731

The following figures include the copper actually produced by the Copper Queen, Moctezuma and Detroit mines for several years before the organization of this corporation, and excludes the copper obtained by smelting ores purchased:

Year	lbs. copper	Year	lbs. copper
1904.....	77,637,595	1909.....	132,890,629
1905.....	89,418,083	1910.....	116,888,070
1906.....	112,281,878	1911.....	123,653,978
1907.....	90,955,963	1912.....	140,628,798
1908.....	115,871,304		

This is one of the few new companies in the copper mining industry that is undercapitalized rather than overcapitalized, and this is but a detail in a general business policy that, while thoroughly progressive and abreast with the times, retains the fundamentally sound and conservative policies developed by the old firm in nearly a century of honorable and markedly successful business life.

PHILADELPHIA-SEARCHLIGHT GOLD & COPPER MG. CO.

NEVADA

Office: 810 Witherspoon Bldg., Philadelphia, Pa. Mine near Searchlight, Lincoln Co., Nev. John C. Groome, pres.; J. M. Stewart, sec.-treas., at last accounts. Organized under laws of Arizona, capitalization \$5,000,000, shares \$1 par.

Lands, 23 claims, 1 fractional, 450 acres, in the Sunrise district, 4 miles N. E. of Searchlight. The mine has a 356' vertical shaft, with crosscuts from bottom showing several veins of 3" to 4' width, carrying auriferous and argentiferous copper ore, of fair tenor, with quartz gangue. Has steam and gasoline power, with necessary mine buildings. Inactive several years.

PHOENIX-BURROUGHS MINE.

COLORADO

Address: Black Hawk, Gilpin Co., Colo. Property on Quartz hill, near Black Hawk, carries the Gunnell Fagan lode with zinc-copper-iron ore netting \$7 to \$14 per ton, developed on the 100' level.

PHOENIX CONSOLIDATED COPPER CO.

MICHIGAN

Office: Calumet, Mich. Mine near Phoenix, Keweenaw Co., Mich. Thos.

F. Cole, pres.; Spencer R. Hill, vice-pres.; Chas. A. Wright, Jr., sec.-treas.; preceding officers and Capt. Thos. Hoatson, directors. Organized April, 1899, in Michigan, capitalization \$2,500,000, shares \$25 par; \$14.50 paid in. Is controlled by the Keweenaw Copper Co., through ownership of about 90% of the share capital, acquired by an exchange of shares on the basis of 10 shares of Phoenix for 1 share of Keweenaw. Ended 1912, with cash \$486, and liabilities of \$42,933. Expenditures for 1912 were \$4,262. Last assessment was \$1 per share, payable Sept. 29, 1913.

Lands, 2,505 acres, carrying 5 different fissure veins, on which more or less mining has been done, at various times. The old Phoenix mine, included in the present consolidation, is famous for having produced the largest mass of native copper ever found, this weighing upwards of 500 short tons. The Phoenix fissure, on which work was begun 1846, was opened to a depth of only about 90', yielding considerable mass copper and silver, one mass of native silver weighing 8 lbs. 10 oz. There also are possibilities on the Ashbed lode, which has been slightly developed by an exploratory tunnel. The mine has extensive openings and a modern equipment, and was worked for 6 years without success, until closed down, June 15, 1905. Diamond drilling on the Ashbed, 1910, gave encouraging results in 6 holes, covering 2,700' along the lode, 1 drill hole giving upwards of 60' of copper cores. A continuation of this work was begun late 1913, after several years of idleness. This exploratory campaign calls for extensive diamond drilling on the Ashbed lode. An old 250' shaft sunk and abandoned 50 years ago has been re-timbered and equipped for sinking. This work, started in Nov., 1913, developed rich ore found where bedrock was exposed for the engine foundations.

PHOENIX GOLD & COPPER M. & M. CO.

WASHINGTON

Office: 702 Carlisle Ave., Spokane, Wash. Mine address: Curlew, Ferry Co., Wash. Geo. Ilse, pres. and gen. mgr.

Property, 18 claims, in 3 groups, 360 acres, in the Curlew district, shows Paleozoic sediments cut by quartz monzonite. Ores carry gold, silver and copper, associated with iron oxides and pyrite, giving assays of 1 to 8% copper, 2 to 10 oz. silver and about \$10 gold per ton.

Development is by 6 tunnels, aggregating 1,500' in length, and 8 shafts of 30 to 100' in depth. A new tunnel, on the Panama group, nearest Curlew, planned to give a back of about 600', was 260' long, Feb., 1913, and was expected to reach the main vein at about 800'. Property considered promising.

PHOENIX MINING, SM. & DEV. CO., LTD.

BRITISH COLUMBIA

Office and mine: Phoenix, Boundary district, B. C. Julius Carson, pres.; N. J. Carson, sec., at last accounts. Organized June, 1908, under laws of British Columbia, capitalization \$1,000,000, shares \$1 par.

Lands, 2 claims, 1 fractional, in the Wellington camp about 3 miles from Phoenix, developed by a 60' shaft, on the Lucky Shot claim, and the Woodburn tunnel, showing silver-copper ore. Was developing with a small force, 1912.

PICACHO MINING CO. (CIA. MINERA DE PICACHO).

MEXICO

Wm. Leaming, superintendent, Bacoachi, Sonora, Mex. J. S. Douglas and associates, owners. Property, 35 miles south of Cananea, has a deposit of cupriferous silver ore that has been under development since about 1909 and is now shipping ore to the Copper Queen smelter at Douglas.

PICKET CREEK DEVELOPMENT CO.

OREGON

Idle. Property, on Picket creek, near Merlin, Josephine Co., is said to show several veins of 3 to 7' width, carrying low to medium-grade gold-copper ore, developed by shaft and tunnels. Equipment includes an air compressor.

PIEDRAS VERDES y ANEXAS; COMPANIA MINERA. MEXICO

Office and mine: Alamos, Sonora, Mex. Angel Almado, pres.; Joaquin A. Mange, supt. Lands, about 15 miles N. W. of Alamos, and 2 miles north of the Rio Mayo, include the Piedras Verdes, Union and Sonora mines, having a mineralized zone of about 1 mile width, and 4 miles length. Claims show red schists carrying copper carbonate stains at surface, with quartz dikes and numerous dioritic intrusions, the veins outcropping 10 to 40' in width and carrying considerable oxidized ore of good grade, with occasional native copper in masses of considerable size. Development is by a 350' shaft and a 375' tunnel. Some churn drilling was done by the General Development Co., 1910.

Equipment includes steam power, and a small matting furnace. Presumably idle.

PIKE HILL MINES, INC.**VERMONT**

Office: Room 709 No. 82 Beaver St., New York city. Mine office: Corinth, Orange Co., Vt. N. M. Macdonald, pres.; H. H. Knox, vice-pres.; John H. Allen, sec.-treas; and D. S. Conant, directors. Organized Jan. 9, 1906, under laws of Vermont, capitalization \$200,000, shares \$100 par.

Lands, 101 acres, freehold, in the Corinth district, 14 miles from the Boston & Maine railway, showing mica-schist carrying lenses of chalcopyrite disseminated in pyrrhotite, of 3.5% estimated average copper tenor. The mine was worked in a small way at intervals during the nineteenth century.

Equipment includes a 75-h. p. steam plant, held in reserve, and a power plant with 20-h. p. and 80-h. p. gas engines and a 25-kw. electric generator.

The wooden concentrator, of 6,600 sq. ft. area, has a 9x15" Blake crusher, 3 rolls and 2 magnetic separators, with roaster and dryer.

Production has been as follows: 131,911 lbs. fine copper in 1905; 304,377 lbs. copper and 1,698 oz. silver in 1906; 425,367 lbs. copper and 2,292 oz. silver in 1907. Product of latter year was secured from 5,951 tons of ore milled, yielding an average extraction of 3.21% copper, and from 624 tons of ore smelted, yielding an average extraction of 3.21% copper, and from 624 tons of ore smelted, yielding an average extraction of 3.21% copper, and from 624 tons of ore smelted, yielding an average extraction of 3.21% copper, and from 624 tons of ore smelted, yielding an average extraction of 3.21% copper. Company planned a 100-ton smelter. Inactive since Nov., 1907.

PILLEY'S ISLAND PYRITES CO.**NEWFOUNDLAND**

Last address: 43 Exchange Place, New York. Mine at Betts Cove, Newfoundland. Organized Dec. 30, 1901, under laws of New York, capitalization \$500,000, as a subsidiary of the Newfoundland Syndicate. Property was the Bets Cove mine, developed by tunnel, which was worked 1874-84, and reopened 1900, for a short time, but was again idle until taken over by this company about 1906. Mine shut down on account of depleted ore reserves and company is presumably dead.

PILOT BUTTE MINING CO.**MONTANA**

Office and mine: Butte, Silver Bow Co., Mont. Edw. Hickey, pres.; Wm. P. Jahn, vice-pres.; J. W. Pratt, treas.; J. J. Harrington, sec.; Patrick Sheehan, mgr.; preceding officers, N. J. Bielenberg, Judge J. J. McHatton, Chas. W. Leonard, L. Casserly and T. E. Murray, directors; L. A. Dunham, cons. engr.; Paul A. Gow, supt. Organized Sept., 1910, as successor of Pilot Butte Copper Mining Co., capitalization \$1,000,000, shares \$10 par; 88,308 shares issued (April, 1913). Listed on New York curb. Registrar and transfer Co., transfer agents; Empire Trust Co., registrar. The old company had a bonded debt of \$121,300, holders of which apparently took 25,000 shares of stock in the new company in payment and \$550,000 in stock was given for the property of the old company.

The company owns the Pilot Butte claim, 10.19 acres, having an average width of 320' and length of 1,405', lying between the Elm Orlu mine on the north, the North Butte mine on the east and south and 600' north of

the Badger State mine of the Anaconda. The property is supposed to carry the extension of 2 of the North Butte veins, and is traversed by the outcrops of several veins running N.-W. across the claim.

The mine is opened by a 2,070' three-compartment shaft, with levels at 500', 900', 1,300', 1,600', 1,800' and 2,000'. Development on the 500' level showed several fault veins without commercial ore and the 900' and 1,300' levels also opened up several veins, 1 with a fair-sized shoot of zinc ore. The only known orebody of commercial size and value is in a copper vein called the South, or Pilot vein, exposed on the 1,300' level, cut in the shaft below the 1,500' station and continued in the shaft to 1,700' in depth. This vein carries 3 to 4' in high-grade glance-bornite ore, on which stoping was begun. The vein has been opened up by a crosscut and 225' of drifting, two-thirds outside the Pilot-Butte and within the Emily claim of the Anaconda Co. on the 1,800' level, and for 121' on the 2,000' level, of which 60' is within the Pilot lines. This work shows the vein to vary from 1 to 15' in width and to carry 4 to 10% copper and 11 oz. silver per ton.

The Anaconda Co. allege trespass in that this vein has its apex on the Emily claim and suit was filed, Sept., 1913, and an injunction issued restraining the Pilot Butte Co. from mining the orebody in controversy. The issue involved is a question of apex. The Pilot Co. admits an apex in the Emily claim but contends that the vein unites with the Pilot vein at 1,600' in depth and that the Pilot Butte Co., having prior location, takes the vein below the junction. There is no doubt of the size and extent of the vein outcrops on the claim, but their downward course is as yet a matter largely of geological inference.

A second vein opened on the 1,800' and 2,000' levels shows 9' of 27% zinc ore on the 2,000' level and a third vein carries lead-zinc-silver ore.

Equipment is new, compact and complete, including a 2-stage 16x36" Nordberg hoist, 5-drill compressor and 125-h. p. boilers. A spur of the B. A. & P. R. R. runs to the mine.

The property, though small, is a valuable one and the mine and management excellent. Shipments were made from the orebody in controversy in the summer of 1913, but have ceased since the granting of the injunction to the Anaconda Co., there being no other veins carrying shipping ore on the property.

PILOT RANGE MINE.

NEVADA

Office and mine: Luning, Mineral Co., Nev. Mrs. Fermina Serrias, owner and mgr.; H. James, supt. Mine bonded 1913. Property, known as the Spanish Woman's mine, 40 claims, unpatented, 800 acres, in the Santa Fe district, 8 miles from the Southern Pacific railroad, shows syenite, andesite and limestone. Ores are azurite, malachite, bornite and chalcopryrite, reported to average 6% copper, 2 oz. silver and \$2 gold per ton.

Development is by shafts and tunnels with total of over 750' of workings. Equipment includes steam plant and several mine buildings.

Property was once under option to the Pilot Range Mining Co., which failed to pay for same. Shipments averaged 300 tons a month in summer of 1913 and with completion of new wagon road, now under construction, will be increased to 50 tons daily.

PINE HILL CONSOLIDATED MINING CO.

CALIFORNIA

Letter unclaimed at former office: 141 Broadway, New York. Mine office: Wolf, Nevada Co., Cal. J. Frank Mase, sec.-treas.; J. A. Robles, supt., at last accounts. Organized under laws of Delaware. Lands, 160 acres, show a vein of about 27' average and up to 100' claimed width, carrying free milling gold ore and a variety of copper ores ranging from native copper, in clay, through cuprite, malachite, chrysocolla and bornite, to chalcopryrite as-

sociated with pyrite, with quartz gangue. The gossan has been mined in a small way, for gold, and there is said to be a gold vein on the footwall. Development is by a 200' two-compartment vertical shaft with about 1,500' of workings.

Equipment includes an 85-h. p. steam plant, with an 8-h. p. hoist and a 2-drill air compressor. Buildings include a boarding house, bunkhouse, laboratory and smithy, and there is a 10-stamp mill. No recent returns secured.

PINTO COPPER MINING CO.

ARIZONA

Letter unclaimed at Globe, Ariz. Thos. P. Kelly, pres. Organized Nov. 21, 1906, under laws of Arizona, capitalization \$1,000,000, shares \$1 par. Lands, 9 claims, near the Arizona National and Globe Standard, on Pinto creek, has a 517' two-compartment shaft, sunk by the Cactus Copper Co., with about 1 mile of workings. Property was under option 1909-10, to the Cactus Development Co. and Cactus Copper Co., but the option presumably was surrendered 1910. The property shows low-grade disseminated copper sulphides, but not in commercial amount.

PIONEER SMELTING CO.

ARIZONA

Office: 50 Church St., New York. Works office: Corwin, Pima Co., Ariz. Wm. Clifford Moore, pres.; G. H. Corwin, vice-pres. and treas.; L. S. Wheeler, sec.; A. L. Waters, mgr.; preceding officers, G. C. Adams, Edw. Benedict and James P. Evans, directors.

Property of the company consists of a custom smelter, the Plumed Knight mine and the control of the Gould mine.

The Plumed Knight mine, in the San Xavier district, 18 miles from Tucson, is opened by shafts to a depth of 335', showing ore rich in iron, lime and silica at and above the 100' level, succeeded by bornite at depth. Ore is said to average 4.25% copper, with small gold and silver values.

The Gould mine, 12 miles west of Tucson, idle several years, is said to contain good fluxing ores carrying about 3% copper. Development is by 2 shallow shafts.

The smelter, 1½ miles west of Sahuarita, and 20 miles south of Tucson, on the Twin Buttes railroad, is of 150 tons daily capacity. The plant has a 106x42" blast furnace, built by the Colorado Iron Works Co. Crude oil is used as smelting fuel, except when the sulphur in the ore is sufficient to permit turning blast into the one set of tuyeres. A crude oil-burning chamber attached to and a part of the furnace, practically acts as a hot-blast tuyere. The blowers are driven by two 90-h. p. De La Vergne crude-oil engines, which also actuate a compressor, deep-well pump and a 55-kw. generator, latter supplying power to the sampling mill.

The sampling mill has a 7x11" Dodge crusher, a Vezin automatic sampler, 16x20" rolls and a Braun disc sample grinder.

Ore for the smelter is received by rail and motor trucks, the company hauling its own ores from the Gould mine to the smelter in a 6½ ton Saurer truck, the road being hard and the grade gentle. The smelter was in blast for a short time in 1912, but is again idle, and the company was in the throes of reorganization at last reports.

PITTSBURGH CONSOLIDATED MINING CO.

UTAH

Letters unclaimed at Salt Lake City, and at American Fork, Utah Co., Utah. S. M. Levy, pres.; J. H. Bigger, gen. mgr., at last accounts. Organized 1903, capitalization \$300,000, shares \$1 par. Lands, 19 claims, including the Pioneer group of 10 patented claims, and 6 claims that were in litigation with the Mountain Lake Extension Mining Co., property lying in Salt Lake and Utah counties, mainly on the American Fork side of the divide. The mine, developed by tunnels from American Fork canyon, has a 200' upper

tunnel showing 2 veins of 15' and 20' estimated average width, carrying silver-lead ore, and has about 1,500' of workings. Idle.

PITTSBURGH-ELY COPPER CO.

NEVADA

Idle. Office: 309 Chamber of Commerce, Denver, Colo. Mine office: Ely, White Pine Co., Nev. H. P. Harder, pres.; Louis H. Bock, vice-pres.; J. A. Varney, sec.; Frank Straub, treas., trustee and gen. mgr. Organized Dec., 1906, under laws of Arizona, capitalization \$5,000,000, shares \$5 par, nonassessable; 695,285 shares outstanding at last reports.

Lands, 11 claims, unpatented, 220 acres, including the Keyboard group of 6 claims, 120 acres, near the Keystone mine of the Nevada Consolidated, and a small group near the Cumberland-Ely mine of the same company. Property shows porphyry and limestone, and the company reports having copper oxides and sulphides, assaying 3 to 12% copper, with no lead, zinc, silver or gold values. Development is by the 60' Keyboard shaft, the 160' No. 2 shaft, and tunnels of 160' and 40'.

Equipment includes a 40-h. p. steam hoist, but there are no buildings. Inactive, except for annual assessment work, since 1907.

PITTSBURGH-IDAHO MINING & MILLING CO.

IDAHO

Office: Kamiah, Idaho. Mine office: Greer, Nez Perce Co., Idaho. Jas. F. Bridwell, pres.; Daniel Laverty, vice-pres. and gen. mgr.; Hugh Laverty, sec.-treas., at last accounts. Organized Jan., 1903, under laws of Idaho, as successor of Pittsburgh-Idaho Mining Co., capitalization \$1,000,000, shares \$1 par.

Lands, 19 claims, 380 acres, in the Lo Lo district, near the Montana line, said to show 6 contact veins, between gneiss and quartz-porphyry of which 2, of 50 to 100' width, slightly developed, carry cuprite, malachite, bornite and chalcopyrite, giving assays up to 12% copper, 14 oz. silver and \$20 gold per ton. Mine has about 1,700' of workings, including pits and shafts, deepest 180', with tunnels of 40', 290' and 600'. Equipment includes gasoline power, and there are 5 small buildings. Idle, and not favorably regarded.

PITTSBURGH-JEROME COPPER CO.

ARIZONA

Idle. Office: 331 Fourth Ave., Pittsburgh, Pa. Mine office: Jerome, Yavapai Co., Ariz. Jos. K. Aikins, pres.; Thos. Houlette, vice-pres.; E. F. Thompson, sec.-treas., at last accounts. Organized 1904, under laws of Arizona, capitalization increased, March 9, 1906, to \$3,000,000, shares \$1 par; issued, \$1,482,699, at last accounts, 1908.

Lands, 26 claims, 520 acres, lying 2 to 3 miles south of Jerome, nearly N. W. of the Black Hills property, and about midway between the United Verde and Equator mines. Development is by the Pittsburgh shaft, planned to have been sunk 1,000', and said to show at 358' depth argentiferous and auriferous sulphide ore of about 4% copper tenor.

Equipment includes a 50-h. p. Fairbanks & Morse hoist, and an Ingersoll-Rand 2-stage air compressor. Inactive since June, 1907.

PITTSBURGH MINE.

COLORADO

Office and mine: Central City, Gilpin Co., Colo. Has developed a vein of gold-silver-copper ore, said to have a gross value of about \$250 per ton. Was making small shipments early 1913.

PITTSBURGH & MONTANA COPPER CO.

MONTANA

Inactive. Office: 1126 Farmers Bank Bldg., Pittsburgh, Pa. Mine address: Butte, Mont. J. H. Reed, pres.; R. T. Rossell, sec.-treas., and receiver in Pittsburgh; preceding officers, T. H. Given, Hay Walker, Jr., and D. C. Noble, directors. Organized July 9, 1902, under laws of West Virginia, capitalization \$30,000,000, shares \$1 par. Bonds, \$3,000,000, at 6%, secured by a mortgage dated June 2, 1906, on which interest was in default, June, 1908, at which date the company also defaulted on the payment of an installment

of \$500,000 bonds due, and the Union Trust Co., of Pittsburgh, trustee under the bond mortgage, instituted foreclosure proceedings under which all properties were sold at public auction, July, 1909, and bought in by the Pittsmtont Copper Co., the owner of the entire bond issue.

The Pittsmtont Co. turned over the property to the East Butte Copper Mining Co., under an arrangement by which the East Butte agreed to advance all funds necessary for the development and operation of the property, and also agreed to care for the interest on the bonded debt. The company was placed in the hands of a receiver July, 1909, under friendly proceedings.

This company is controlled, through the ownership of 90% of the stock, and all of the bonds, by the Pittsmtont Copper Co., which in turn is controlled by the East Butte Copper Mining Co., and although the Pittsmtont Copper Co. bought the entire property of this company at foreclosure proceedings, this corporation is kept alive though for what purpose it is difficult to comprehend. See Pittsmtont Copper Co.

PITTSBURGH & MOUNT SHASTA GOLD M. & M. CO. CALIFORNIA

Office: 1406 Commonwealth Bldg., Pittsburgh, Pa. Mine office, Keswick, Shasta Co., Cal. B. H. Scott, pres.; Dr. J. H. Phillips, vice-pres.; J. S. Parish, sec.; T. V. Scott, treas. Organized 1903, under laws of West Virginia, capitalization \$500,000, increased later to \$1,000,000, shares \$1 par.

Lands, 9 claims, partly patented, 170 acres, known as the Bennington group, in the Flat Creek district, north of Redding, said to have been bought for \$18,000 cash and \$60,000 shares. Mine has a 280' crosscut tunnel and 2 other tunnels showing gold and silver-bearing copper ore of varying tenors. Has a carpenter shop, smithy, boarding house and 3 bunkhouses, with electric power. Shut down several years.

PITTSBURGH-NEW YORK COPPER MINING CO. MONTANA

Office: 33 West Granite St., Butte, Silver Bow Co., Mont. Mine near Marysville, Lewis & Clark county, Mont. Jerry Mullins, pres.; W. H. Lindsay, sec.-treas., and Capt. W. J. Dawson, Los Angeles, Cal., directors. Organized under laws of Montana, capitalization \$1,500,000, shares \$1 par.

The company owns the Umatilla gold mine, having a 5-stamp mill and 50-ton cyanide plant, near the Drumlummon mine, at Marysville, in the Marysville district, about 8 miles from Helena, and 7 claims, on Timber butte south of Butte. Company lost its option on 5 claims at Elkhorn, Mont., in 1910. In debt and idle.

PITTSBURGH-OAXACA MINING CO. MEXICO

Office: 119 Farmers Bank Bldg., Pittsburgh, Pa. Mine office: San Bárto Coyotepec, Centro, Oaxaca, Mex. W. J. Burke, pres.; P. J. Kane, vice-pres.; M. J. Gannon, sec.-treas. Organized 1904, under laws of Delaware, capitalization \$50,000, increased later to \$1,000,000, shares \$1 par.

Lands, 104 hectares, including the Solada mine at Nochixtlán, and the Zavaleta mine in the Zimatlán district, carrying copper ores with mainly gold values, but having some ore ranging up to 5 and 9% in copper tenor. Property is reached by the Mexican Southern railway. The mines, developed by shaft, are said to have about 7,000' of workings on a 5' vein.

The 50-ton Zavaleta mill, connected with the mine by a 1,500' ground tram, is equipped with 10 stamps, a 10' Lane slow-speed mill, and a Pinder concentrator. There also is an electric light plant. Idle.

PITTSMONT COPPER CO. MONTANA

Office: 1126 Farmers Bank Bldg., Pittsburgh, Pa. Mine office: Butte, Mont. J. H. Reed, pres.; R. H. Gross, F. H. Given, Hay Walker, Jr., and D. C. Noble, directors. R. T. Rossell, sec.-treas.

Organized April 21, 1906, under laws of West Virginia, as Pittsburg & Western Copper Co., and changed name, Jan. 21, 1908, to present title.

Capitalization \$11,000,000, par value \$5, divided into 2,000,000 shares common stock and 200,000 shares 6% cumulative preferred stock. Of the authorized common stock 1,000,000 shares are reserved for retirement of its 6% bonds, \$2,500,000 authorized and \$1,488,332 outstanding Sept. 1, 1913.

Company is practically the successor of the Pittsburgh & Montana Copper Co., having acquired the property of that company at judicial sale under foreclosure proceedings, July, 1909. This property was then turned over to the East Butte Copper Mining Co., under an arrangement by which the East Butte agreed to purchase a sufficient amount of the bonds of the Pittsmont Copper Co., to fund its floating debt, aggregating at that time \$2,300,000, and also agreed, until these bonds were fully paid for, to advance all funds necessary for the development and operation of the property and interest on the company's indebtedness. In consideration of this agreement the Pittsmont Copper Co. contributed \$4,000,000 of its common stock to the East Butte Copper Mining Co., the latter in further agreement purchasing \$1,000,000 of Pittsmont preferred stock and \$110,000 of demand notes, issuing its own stock therefor, and the East Butte thus becomes the owner of the entire outstanding indebtedness of the Pittsmont Copper Co., represented by bonds and common and preferred stock (see East Butte Copper Co.).

PITTSMONT SMELTER.

MONTANA

At Butte, Mont. Owned by East Butte Copper Mining Co.

PLATA-FINA MINING & DEVELOPMENT CO.

MEXICO

Office: 306 Long Bldg., Kansas City, Mo. Mine office: Alamos, Sonora, Mex. E. G. Swayze, pres.; Dr. L. R. King, vice-pres.; J. E. Wilson, sec.; F. A. May, treas.; T. P. Brinegar, mgr.; other directors, J. N. Nolan and C. N. Emery. Organized March, 1911, under laws of Arizona, capitalization \$500,000, shares \$2 par; issued, 91,890 shares.

Lands, 5 claims, 38½ acres, patented, 4½ miles from a railway, in the Alamos district, show several contact veins between granite and porphyry, in a zone 40' wide.

Development is by 4 shafts, deepest 115', with about 425' of workings. Ore is said to show native silver in copper carbonate and chalcocite and is reported to assay from 2 to 20% copper, 6 to 5,000 oz. silver and \$1 to \$70 gold per ton, which figures are misleading.

PLATANOS, S. A.; CIA. EXPLORADORA DE LOS.

MEXICO

Is the Mexican holding company of Los Platanos Development Co.

PLATINUM MINING & MILLING CO.

WYOMING

Address: 912 Main St., Merrill, Wis. Mine address: Holmes, Albany Co., Wyo., Julius Thielman, pres. and mgr.; David Finn, vice-pres.; Robert Thielman, sec., and W. A. Lee, directors. Leo von Rosenberg, cons. eng.; L. C. Wannemaker, supt. Organized Jan., 1912, under laws of Wyoming, capitalization \$200,000, shares \$1 par; issued, 25,000. Annual meeting, second Monday in January.

Property, the Rambler mine, held by 15-year lease, with 15 claims patented, 285 acres, in the Douglas district. Claims show a fissure vein reported as 20' wide in granite, running N. W.-S. E. and dipping at 45° E. Development includes a 200' vertical shaft with drifting on the vein on the 100' and 200' levels. Work was begun June, 1912, but neither mine nor mill were operated during 1913, as mill is being remodelled and a 50-ton Peck centrifugal concentrator installed. Operations are expected to begin Dec., 1913.

Mine was located in 1870 for gold, relocated 1900 for copper and worked 1906 by Rambler Mining & Smelting Co., consolidated 1908 with New Lincoln Copper Co., as Rambler Copper & Platinum Co. See Rambler mine.

PLUTO GOLD & COPPER MINING CO.**WYOMING**

Idle. Office: 55 High St., Oshkosh, Wis. Mine near Dillon, Carbon Co., Wyo. Ole Granberg, pres. and gen. mgr.; H. Thorsgaard, vice-pres.; H. O. Granberg, sec.-treas. Organized Dec. 15, 1902, under laws of Wyoming, capitalization \$1,000,000, shares \$1 par.

Lands, 11 claims, patented, 220 acres, and a 40-acre mill site, in the Battle Lake district, near the Ferris-Haggerty mine, showing both fissure veins in quartzite and contact deposits between diorite and quartzite, ranging 2 to 30' in width, and carrying cuprite, melaconite and copper sulphide ores associated with manganese, giving average assays of 1% copper, a trace of silver and \$3 gold per ton. Developed by numerous pits of 10 to 20' depth, 5 shafts of 55 to 100' depth, and a tunnel of 1,004' with about 2,000' of underground workings. Equipment includes a 40-h. p. steam plant and 3-drill air compressor. Buildings are a 36x40' machine shop, 38x20' carpenter shop, and 6 other mine structures. Inactive, except for annual assessment work, since Oct., 1907.

PLUTO MINING CO.**ARIZONA**

A. E. Jenkins, superintendent, Amadoville, Santa Cruz Co., Ariz. Owns the Pluto mine, showing a copper deposit developed by tunnels. Is equipped with electric power. Operated 1912 with a force of about 25 men.

PLUTUS MINING CO.**UTAH**

Office: care Knight Investment Co., Provo, Utah. Mine office: Eureka, Juab Co., Utah. Jesse Knight, pres.; Jacob Evans, vice-pres.; R. Eugene Allen, sec.-treas. Organized 1907, under laws of Utah, capitalization \$100,000, shares 10 cts. par, assessable; fully issued. Absorbed the Tetro Mining Co., Jan., 1909. Shares are listed on the Salt Lake Stock Exchange.

Lands, 14 claims, patented, including the Tetro group of 3 claims, from which the Tetro Mining Co. paid \$18,000 in dividends. Property carries auriferous and argentiferous lead and copper ores, developed by a 600' shaft, about 3,700' of tunnels, and 1,250' of other workings. The Tetro group was under lease to W. L. Mangum and J. H. McChrystal, late 1912.

Equipment includes a 75-h. p. electric motor, hoist and air compressor. Buildings include necessary shops and an office.

POCAHONTAS COPPER MINING CO.**CALIFORNIA**

Office: 112 Market St., San Francisco, Cal. Mine office: Lewis, Mariposa Co., Cal. David Ross, general manager, at last accounts. Lands, 150 acres, supposedly held under bond and lease from Mrs. Abby Waller, including the Great Northern mine, in the White Rock district. The claims show several veins of cupriferous iron ore, between diorite, with altered diabase gangue. The main orebody, about 100' in width, occurs in a mineralized zone up to 1,000' across, having an oxidized zone of about 100' depth, from which a limited production of high-grade ores was made many years ago. Development is by a new 200' shaft and tunnel, these workings being said to show ore carrying 6 to 12% copper and about \$2.50 gold per ton.

Equipment includes steam power and a hoist, and buildings include an office, laboratory, smithy and bunkhouses. Was making small shipments to the Selby-smelter early 1913.

POCAHONTAS COPPER QUEEN MINING CO.**ARIZONA**

Office: Pocahtonat, Ark. Mine office: Mayer, Yavapai Co., Ariz. Jos. W. Voorhees, pres. and gen. mgr.; J. D. Hardwick, vice-pres.; D. A. Chapin, sec.; Benj. A. Brown, treas.; W. H. Skinner, supt.; preceding officers, T. P. Eastland, Wm. S. Shannon and L. C. Viles, directors. Organized 1906 as successor of Big Bug Gold & Copper Mining Co., capitalization \$1,000,000.

Lands, 14 claims, 4 miles N. W. of Mayer, in 2 groups, about 1,000' apart. The smaller group of 4 patented claims carries gold-copper ore. The

Spar group of 10 claims has a vein up to 14' in width, carrying mainly gold and silver-lead values, and the mine is said to have shipped 23 carloads of high-grade ore, under former ownership, that gave sufficient returns to pay the purchase price and the cost of development. The mine has a 200' two-compartment shaft and a 100' shaft.

Equipment includes steam power, and some grading was done for a new mill. Presumably shut down.

POCATELLO GOLD & COPPER MINING CO.

IDAHO

Office and mine: Pocatello, Bannock Co., Idaho. H. W. Lockhart, pres.; N. M. Eldredge, gen. mgr. Organized Dec. 1, 1902, under laws of Idaho, capitalization \$1,000,000, shares 50 cents par.

Lands, 7 claims, 140 acres, in the Fort Hall district, 12 miles east of Pocatello, show a vein of about 3' average width, reported to give assays of 30% copper, 13.8 oz. silver and \$1 gold per ton, from bornite and chalcopryrite ore. Ore is mainly of milling grade with a small paystreak of rich ore, from which shipments to the White Knob smelter gave returns of 17 to 30% copper and 15 to 18 oz. silver per ton. Development is mainly by short tunnels, with about 1,000' of workings. Was developing with small force at last accounts.

POLARIS MINING & MILLING CO.

ARIZONA

Office and mine: Clifton, Graham Co., Ariz. C. A. Van Dorn, pres.; Sam. Abraham, vice-pres.; J. H. Kerby, sec.; J. R. Hampton, treas.; G. A. Franz, gen. mgr.; at last accounts. Organized March 15, 1902, under laws of Arizona, capitalization \$2,500,000, shares \$1 par.

Lands, 40 claims, 700 acres, also a 70-acre mill-site and 400 acres miscellaneous lands, in the Greenlee district, on the San Francisco river, about 7 miles from Clifton, the nearest rail point. The claims lie N. W. of the Clifton Consolidated and New England mines and show granite, with porphyry dikes at acute and right angles to the vein system, carrying ore in contact deposits between limestone and igneous rocks, and as disseminated ores in porphyry. There are 4 orebodies, of which 2, under development, are of 8 to 100' estimated average width, traceable 6,000', carrying oxide, carbonate and sulphide ores, estimated to average 3% copper, 4 to 15 oz. silver and \$4 to \$15 gold per ton. The lower workings show mainly chalcopryrite. The mine is opened by the 105' Black Prince shaft, the 100' Nonesuch shaft, the 140' Golden Eagle shaft, the 560' Black Prince tunnel, the 320' Fraction tunnel, the 307' Golden Eagle tunnel and the 532' Phonolite tunnel, with about 2,500' of workings, at last accounts.

Improvements include 6 mine buildings. The property was under lease to the Southwestern Development & Improvement Co., 1912. Idle.

PONDERAY SMELTER.

IDAHO

At Sandpoint, Bonner Co., Idaho. Owned by Idaho Smelting & Refining Co.

PONTIAC MINING CO.

VIRGINIA & NORTH CAROLINA

Idle. Mine office: Virgilina, Halifax Co., Va. A. A. Sumner, pres.; Samuel Bryant, sec. Organized 1902, under laws of New York, capitalization \$1,600,000, shares \$10 par. Lands, 1,340 acres, in the Virgilina district of Halifax county, Va., and Person county, N. C., carrying a quartz vein in schist opened by the Tuck shaft of 125' and the Glasscock shaft of 203', showing oxidized copper ore to depth of 60', underlain by chalcocite, bornite and chalcopryrite ore, with quartz and epidote gangue, giving average assays of .4% copper, 1 to 2 oz. silver per ton, and traces of gold. Has gasoline power.

PONTOTOC MINING CO.

ARIZONA

Office and mine: Tucson, Pima Co., Ariz. F. F. Simms, pres.; T. H.

Bass, sec.-treas.; Duran Daily, gen. mgr. Lands, 28 claims and 4 mill sites, adjoining the Big Vein Copper Co., in the foothills of the Santa Catalina mountains, 8 miles N. E. of Tucson. The mine has a 105' shaft, showing ore assaying up to 10.3% copper, with an average of about 5%. Idle several years, but was preparing to resume development work early 1913.

PORTAGE LAKE & BISBEE MINING CO. ARIZONA

Office: care John Funkey, Hancock, Mich. Mine address: Bisbee, Ariz. Chas. Lewis, treasurer. Organized April, 1903, under laws of Arizona, capitalization \$1,000,000, shares \$1 par, succeeding Portage Lake & Calumet Development Co.

Lands, 12 claims, 3 fractional, 191 acres, several patented, 3 miles S. E. of Bisbee, showing country rock of limestone, with a porphyry contact. The mine has a 302' shaft, with 2 compartments, well timbered, with a small air compressor, Worthington sinking pump, 75-h. p. hoist, boarding house, bunkhouse and smithy. Extensive diamond drilling was done 1903-04, when considerable leached ore was cut, the work being of an encouraging nature. Inactive many years, but not dead.

PORTLAND MINING CO.

BRITISH COLUMBIA

Office: 19 North Seventh St., Terre Haute, Ind. Mine near Aspen Grove, Yale district, B. C. Andrew J. Crawford, pres.; M. T. Hidden, sec., at last accounts. Organized 1901, under laws of British Columbia, capitalization \$15,000, shares 1 ct. par.

Lands, 4 claims patented, 200 acres, also 160 acres miscellaneous lands, in the Aspen Grove district, show 10 veins. Two veins slightly developed, gave assays of 15% copper, 3 oz. silver and 80 cts. gold per ton, from carbonate and sulphide ores, opened by a 155' shaft and a 32' tunnel, said to show a considerable body of low-grade ore. Idle many years.

POZO GILPIN MINING CO.

COLORADO

Halsted Lindsley, superintendent, Idaho Springs, Clear Creek Co., Colo. Mine has lead-copper ore mined for its gold-silver values, by shaft and tunnel work. Company employs about 30 men when operating and has steam power plant with Ingersoll-Rand compressor.

POZOS; NEGOCIACIÓN MINERA DE.

MEXICO

Mine office: Pozos, Ciudad Porfiro Diaz, Guanajuato, Mex. Company owns the Santa Brigida y Anexas, Santa Lucia and La Argentina mines, yielding gold, silver and copper, latter as a byproduct. The first named mine is largely worked out. Has steam power.

PRECIOUS METALS CORPORATION.

COLORADO

Office: 17 Battery Place, New York city. Mines in Mill gulch, San Juan Co., Colo. Chas. E. Force, pres.; Chalmers Dale, treas.; John S. Ferguson, sec., and Chas. Maxcy, directors. Organized Nov. 15, 1906, in Colorado, capitalization \$5,000,000, shares \$5 par; issued, \$4,250,000. Bonds \$200,000 authorized, none issued. Columbia Knickerbocker Trust Co, New York, registrar. Annual meeting, third Monday in November. Company owns the entire stock issue of the East Canada Smelting Co., Ltd., which owns and operates the McDonald copper-sulphur mine at Weedon, Quebec. Operations for 1911 showed gross earnings of \$6,947; expenses, \$15,230; deficit, \$8,283; cash on hand, \$10,607.

Company owns the Silver Crown group, 13 claims, 8 patented, and 4 mill sites, about 7 miles from Silverton; also the Forest and John mines, 9 miles distant, patented and freehold.

PRICE COPPER MINING CO.

COLORADO

Office and mine: Radium, Grand Co., Colo. Walter R. Price, superintendent. Property, though but slightly developed by a tunnel, shows considerable copper ore.

PRICKLY PEAR MINING CO.**MONTANA**

Office: care J. C. Murray, Helena, Mont. Mine address: Jefferson City, Jefferson Co., Mont. Company owns the Prickly Pear mine, 2 miles from Jefferson, opened by a 350' tunnel, showing gold and silver-bearing copper ore. Has no power equipment.

PRIEST LAKE COPPER MINING & MILLING CO.**IDAHO**

Office: 323 Lindelle Blk., Spokane, Wash. Mine office: Hillyard, Spokane Co., Wash. Lands, 2 claims in Bonner county, Idaho, between Granite and Reeder creeks, which empty into Priest lake. The Copper Age claim has a 90' shaft, and there is a 50' shaft on the Pearl claim, showing ore said to give combined assay values of \$12 to \$45 per ton in copper, silver and gold. No returns secured.

PRIEST LAKE MINING & SMELTING CO.**IDAHO**

Office and mine: Coolin, Bonner Co., Idaho. C. D. McLean, pres. and gen. mgr. Organized May 14, 1908, under laws of Arizona, capitalization \$1,500,000, shares \$1 par, nonassessable; issued, \$1,200,000.

Lands, 30 claims, unpatented, 600 acres, and a 5-acre mill site, showing 3 contact deposits between schist and granite, of which 1, under development, carries chalcopryrite and galena, estimated by management to average 1% copper, 13% lead, 5 oz. silver and \$1 gold per ton. The mine has shafts of 68', 44', 48' and 20', with tunnels of 650', 440', 80', 128' and 100'. There is no power equipment.

PRINCESS COPPER CO.**NEVADA**

Office: Salt Lake City, Utah. Mine office: Ely, White Pine Co., Nev. C. W. Freed, pres.; F. J. Austin, sec.; H. P. Clark, treas. Organized 1911, capitalization \$1,000,000, shares \$1 par.

Lands, 30 claims, about 550 acres, acquired of the Ely Resurrection Copper Co., in the Robinson district, lying a little north and east of Ely.

Mine has 2 short tunnels and a 140' shaft, showing 18' of ore assaying up to 5% copper, with gold and silver values. Also has some highgrade ore assaying up to 46% lead and 110 oz. silver per ton, with good gold values.

PRINCETON COPPER MINING & SMELTING CO.**ARIZONA**

Letter unclaimed at former office, 52 Broadway, New York. Mine office: Ft. Huachuca, Cochise Co., Ariz. Henry Hamburg, pres. and gen. mgr.; Herbert M. Karner, sec., at last accounts. Organized 1901, under laws of South Dakota, capitalization \$2,500,000, shares \$1 par.

Lands, 8 claims, known as the Texas group, formerly called the Exposed Reef and Citric, in Ramsey canyon, Hartford district of the Huachuca mountains. The mine is developed by 4 shallow shafts, deepest 80', and 4 tunnels, longest about 2,000', latter, at a distance of 750' from portal, cutting a vein of 18' reported width, carrying streaks of ore said to average 6% copper and 10 oz. silver per ton, and at 1,525' from the portal a 2' vein carrying chalcocite. The property shows considerable low-grade copper and lead ore, giving assays of 10% and upwards in copper, and 10 to 15 oz. silver per ton, with small gold values. The property was discovered 1880, worked 1901-05, and then intermittently until 1909.

Equipment includes a 40-h. p. boiler and a 4-drill Sullivan air compressor, fuel being wood cut from the tract. Buildings include a smithy, warehouse, and quarters for employees.

PROGRESSIVE MINING CO.**UTAH**

Office: 229 South West Temple St., Salt Lake City, Utah. Mine near Milford, Beaver Co., Utah. L. B. Bohn, pres.; I. Lessing, vice-pres. and mgr.; C. T. Mixer, sec.-treas. and cons. engr.; preceding officers, F. J. Nichols and C. C. Crismon, directors. Organized Aug. 20, 1906, under laws of

Utah, capitalization \$250,000, shares 50 cts. par, assessable; fully issued. Total assessments to date, \$10,000.

Lands, 5 claims, 130 acres, patented, in the Star district, 8 miles from a railway, carrying argentiferous copper and lead ores. The mine has a 150' incline shaft, with about 1,000' of workings, developing a 3' vein, carrying ore assaying up to 8% copper, 35 oz. silver and \$1 gold per ton. A few small shipments have been made.

PROMONTORIO CONSOLIDATED MINING CO.

MEXICO

Office: 99 John St., New York. Mine office: Lampazos, Moctezuma district, Sonora, Mex. R. S. Vickers, manager, at last accounts.

Lands, 11 groups, 1,410 acres, 3 miles from the forks of the Yaqui river; also a 12,000-acre ranch and the Marguerite and Inez claims, adjoining the mineral lands. Property includes the Promontorio mine, in the Promontorio mountains, 35 miles S. E. of Moctezuma, and about 30 miles from the nearest railway at Tonichi. The Promontorio is an antigua, or ancient mine, said to have produced the copper from which were cast the bells on the old church at Moctezuma, built A. D. 1640. During the American Civil War some bornite from this mine was packed, on mules, 40 miles to Guaymas and shipped to Swansea for smelting.

The Promontorio shows diorite, granite and limestone, carrying orebodies in a shear zone between granite and diorite, with high-grade bornite and low-grade disseminated chalcopyrite ore. The low-grade zone is upward of 200' in width, with a granite footwall, also carrying low-grade impregnations of copper.

The Inez mine shows a large gossan, mined for flux, underneath which is cupriferous pyrrhotite, carrying small gold and silver values, and the Inez is also said to have another orebody of promise, carrying auriferous and argentiferous copper ore.

The mine has been developed, without steam power, by tunnels, but the company plans utilizing a large available water power on the Yaqui river.

PROMONTORY MINING CO.

UTAH

Office: 54 Commercial Bldg., Salt Lake City, Utah. Mine office: Promontory, Box Elder Co., Utah. B. D. Siegfus, pres. and mgr. Capitalization \$600,000, shares \$1; issued, 450,000.

Lands, about 7 miles north of Promontory point, show a contact deposit between dolomite and porphyry.

Development is by a 105' shaft, sunk on an 8' vein, showing copper ore with a paystreak said to give assays of 5 to 18% copper, 1 to 40 oz. silver and about \$9 gold per ton.

PROTECTORA y ANEXAS; COMPAÑIA MINERA LA.

MEXICO

Mine office: San Salvador, Mazapil, Zacatecas, Mex. Percy A. Babb, pres. and gen. mgr.; J. L. Miranda, sec.; D. B. Andrews, supt., at last accounts. Organized 1907, under laws of Mexico, capitalization 100,000 pesos, fully paid. Lands, 68 hectares, including La Protectora y Anexas and San Francisco mines carrying oxide ores, with copper, lead and zinc occurring as replacements in limestone. Low-grade ores average 2.5 to 5% and high-grade ores 12 to 19% copper. Mine has a depth of 100 meters with about 1,500 meters of workings. Equipment includes a 15-h. p. gasoline hoist. Was working with about 200 men, early 1913, and shipping around 250 tons of high-grade ore monthly.

PROVIDENCE COPPER CO.

ARIZONA

Letters unclaimed at former offices: 401 White Bldg., Buffalo, N. Y., and Paradise, Cochise Co., Ariz. J. A. Lewandowski, pres. and gen. mgr.; Leo. F. Tucholka, sec.-treas., at last accounts. Organized Oct. 19, 1908, under laws of Arizona, capitalization \$1,250,000, shares \$5 par, nonassessable.

Lands, 8 claims, unpatented, 160 acres, known as the Rabbit group near Dunn springs, 16 miles S. W. of Paradise, and 12 miles from nearest rail station, at San Simon. The property shows limestone, quartzite and rhyolite, having contact deposits carrying oxidized copper ores. Development is by 24 trenches, pits and shafts, including No. 2 shaft of 40' and No. 5 shaft of 100', showing copper oxides and occasional native copper in small quantities. The mine has no power equipment or buildings. Idle, except for annual assessment work.

PROVIDENCIA MINING CO.

ARIZONA

Office: Nogales, Santa Cruz Co., Ariz. H. C. Greenwell, E. C. Hardy and L. C. Gasche, incorporators. Property is the Providencia mine, 12 miles N. W. of Nogales.

PRUDENTIAL COPPER MINING CO.

ARIZONA

Idle. Office: 322 Federal St., Chicago, Ill. Mine office: 35 Bank of Arizona Bldg., Prescott, Ariz. H. H. Linney, agt.; Geo. T. Clark, pres.; Geo. H. Jenkins, vice-pres. and treas.; Fletcher B. Gibbs, sec.; Ernest A. Haggott, cons. engr.; preceding officers, Lester Shea Smith, Geo. T. Aimer and Alice R. Woods, directors. Capitalization is 500,000 shares and company is controlled, through the ownership of 422,778 shares, by the Estate of Maj. Shea Smith. Lands, 12 claims, patented.

PTARMIGAN MINES, LTD.

BRITISH COLUMBIA

Office: care H. H. Johnson, Victoria, B. C. Property is the Big Interior group of 8 claims near the mouth of Bear river, on Bedwell sound, Vancouver island. See Big Interior mine.

PTARMIGAN MINES OF THE SELKIRKS.

BRITISH COLUMBIA

Mine office: Wilmer, Northeast Kootenay, B. C. Thos. Starbird, manager, at last accounts. Lands, at the head of McDonald creek, an affluent of Horse Thief creek, show highly auriferous and argentiferous copper ores, mainly tetrahedrite. Mine has a 134' shaft with about 3,000' of workings. Equipment includes water power and a small steam plant. Practically idle since 1903 awaiting completion of a projected railway.

PUEBLA SMELTING & REFINING CO.

MEXICO

Office: 35 Nassau St., New York. Mexican office: Isabella Catalica No. 33, Mexico City, Mex. Mine office: Cuyuaco, Puebla, Mex. Chas. Q. Davis, pres. and gen. mgr.; Harvey C. Garber, vice-pres.; H. H. Nieman, sec.; B. P. Thom, treas.; preceding officers, P. W. Luper, Wm. B. Reed, Jr., and I. W. Lofland, directors; G. Mouro, supt.; H. L. Swain, cons. engr.; C. I. McReynolds, purch. agt.

Organized Oct., 1912, under laws of Delaware, capitalization \$5,000,000, shares \$5 par, nonassessable. Debentures, \$1,000,000 at 6%. Guaranty Trust Co., New York, registrar. Property is a 72% stock interest in the Cia. Minera Explotadora El Magistral y Anexas, and also sundry lands acquired from the Bankers Mining & Development Co. for \$4,250,000 in stock and bonds of the Puebla Smelting & Refining Co.

Lands, 28 claims, 1,600 acres mineral lands, 120 acres timber lands, 800 acres coal lands, a 25-acre smelter site and 100 acres miscellaneous lands, in the Majistral district.

The property shows limestone porphyry and diorite, orebodies occurring as contact deposits between limestone and diorite, and as replacements in the limestone. Ores carry oxides and carbonates of copper with small quantities of silver bromides, sulphides and free gold in the oxidized zone. The deeper workings show chalcopyrite associated with hematite having a garnetiferous quartz gangue in the sulphide zone.

Development is by numerous tunnels of from 200 to 750', with about

6,700' of workings, showing ore said to average 3.5% copper, 70 grams silver and 1.5 grams gold per ton.

The company claims to have, in Mexico, a power plant for the mines and smelters, consisting of two 400-h. p. Babcock & Wilcox water-tube boilers, a 300-h. p. Allis-Corliss engine, a 200-h. p. Hughes-Philips Corliss engine, and a 225-kw. Westinghouse generator, and was preparing, early 1913, to erect a 500-ton smelter, designed primarily as a custom plant. The smelter is to have a 46x160" Traylor water-jacket blast furnace and a 250-ton reverberatory furnace, as a first unit.

PUEBLO SMELTER.

COLORADO

Is owned by the American Smelting & Refining Co., which see.

PUGET SOUND REDUCTION CO.

WASHINGTON

Works office: Everett, Snohomish Co., Wash. Is controlled, through stock ownership, by American Smelters Securities Co. The works have three 30x180" blast furnaces, 1 running on copper ores, making a 50% matte, which is blown up to blister copper in a reverberatory furnace and shipped east for electrolytic refining. The plant includes an arsenic plant, formerly making about 5 tons of arsenic daily from Monte Christo ores.

PUTNAM ENGINEERING CO., C. H.

NEW MEXICO

Address: Los Angeles, Cal. Mine near Alma, Socorro Co., N. M. Property, the Little Charley mine in the Mogollon district, operated under bond and lease expiring 1914, from the Mogollon Gold & Copper Co. Mine produced several thousand tons of gold-copper ore, shipped either to local mills or to smelters in 1913.

Equipment includes a 25-h. p. oil engine and an electric hoist. Production averaged 20 tons daily in Aug., 1913.

Q. S. MINING CO.

WASHINGTON

Office: S. 1424 Lincoln St., Spokane, Wash. Mine office: Loomis, Okanogan Co., Wash. Dr. E. H. Thatcher, pres. and gen. mgr.; W. E. Gamble, vice-pres.; Arthur Reed, acting sec.; E. J. Hyde, treas., and Milton N. Rogers, directors.

Organized March 13, 1909, under laws of Washington, capitalization \$2,000,000, shares \$1 par, as successor of Q. S. Gold Mining & Smelting Co., property of which was foreclosed March 4, 1908, on a mortgage, and bid in by trustees at mortgage sale, April, 1909, for the benefit of the new company. Stock of the old company was retired on the basis of actual cost to holders, ranging from 5 cts. to \$1 per share, and the old stockholders were practically assessed a portion of their holdings in order to provide a treasury fund. The stock issued to old shareholders was pooled for 5 years and the 250,000 shares of treasury stock is "guaranteed" by the Granite Securities Co., which promises to pay face value for the stock in case the company does not pay in dividends within 10 years as much as the stock cost the purchaser. This form of guarantee is regarded with suspicion.

New management in 1912 writes that assessment work was not done in 1911 and company had \$17,000 debts. No returns secured for 1912 and company evidently is in financial distress.

Lands, 23 claims, with 80 acres of mill sites, and water rights on Sinlahekin creek, about midway between Loomis and Conconully, along the flank and crest of Aeneas mountain, in the Salmon River district. The property shows massive veins in diorite carrying mainly low-grade copper ores. The company claims an orebody 300' wide at surface, which has been crosscut for 238' at a depth of 800' below the outcrop without reaching the wall, and traced by stripping for 6,000' on surface, showing a ledge of 212' width at the north, 300' in the middle and 285' at the southern end of the property.

Development, begun 1897, is by 2 open cuts at either end, a pit of 50x

156' in the middle, and a tunnel 1,063' long cutting the vein at depth of 800', with another tunnel, intended for the main avenue of extraction, 364' long, planned to cut the orebody at depth of 2,000'. One tunnel shows chalcopryrite ore giving assays of 11.4% copper and estimated to average 2 to 4% copper, with small and variable silver values and about \$1 gold per ton. The company claims an average ore value of \$14 per ton from several hundred assays.

Equipment includes a 220-h. p. hydro-electric plant, taking water from Sinlahekin creek, and there is an air compressor. Buildings include a saw-mill, carpenter shop, smithy, office, barn, 26-room bunkhouse, library, cold-storage plant, changing house and boarding house for 100 men. Development has been retarded by lack of transportation facilities, but the Great Northern railway has built to within about 18 miles and survey was made several years ago for the line of the Okanogan Electric railway, planned to run from Nighthawk to Brewster, Wash., crossing the property. The claims of the company as to tonnage and ore values are much greater than are warranted by present development, but the property is considered promising, and new management may succeed, in the face of repeated discouragements.

QUALEY MINE.

NEVADA

Frank D. Qualey, owner, Qualey, Mineral Co., Nev. The mine is on the S. E. slope of Whiskey flat, accessible by good road from Thorne. Property, 30 claims, covering a belt 20 to 100' wide, shows a contact metamorphic ore deposit whose outcrop is copper stained in numerous opencuts and traceable for nearly a mile north across a hill, 1,000' high.

Development consists of 2 working tunnels, the uppermost 500' below the vein outcrop, the other 250' lower. The first is a 1,000' crosscut tunnel showing the vein, where reached, to be 80' wide with dip of 40° and a reported value of \$12 per ton. The 1,600' lower tunnel opens a deposit said to be 200' wide with mixed oxides and sulphides of copper said to average 4% copper and \$3 to \$4 gold per ton, which is too high to be a reliable average for a deposit of this nature. The ore is reported to carry lime and iron and to be self fluxing.

QUANTOCK MINING & MILLING CO.

MONTANA

Mine office: Coloma, Powell Co., Mont. H. B. Salisbury, superintendent, at last accounts. Property has gold, silver and copper ores, and is equipped with steam power. Shut down for several years.

QUARTZ KING MINING CO.

ARIZONA

Idle. Office: 3118 South Grand Ave., Los Angeles, Cal. Mine office: Parker, Yuma Co., Ariz. Hon. Theo. A. Bell, pres.; Hon. J. G. Maguire, vice-pres.; Hon. Richard Melrose, sec.; Col. E. B. Atkinson, treas.; J. O. Royer, gen. mgr.; L. M. Simon, supt.; O. E. Clark, cons. engr. Organized July 27, 1904, under laws of Arizona, capitalization \$1,500,000, shares \$1 par. Annual meeting, first Tuesday in August. The company was financed mainly by Swedish capital, supplied largely by the late King Oscar, about 500,000 kroner, or \$134,500, having been expended up to 1910.

Property, about 100 claims, 2,000 acres, 7 miles by road N. E. of Parker and 1½ miles east of the Colorado river. The ore deposit occurs in a rather narrow shear zone, or fault plane, in amphibolic and chloritic schists, these rocks being covered by basalt and tuffs in the region nearby. The ore zone is vertical and consists of crushed country rock cemented by quartz carrying malachite, chrysocolla and hematite with fair gold values.

Development includes a 300' shaft with about 1,000' of workings on the eastern part of the property and 700' above the river. In 1911 the new King shaft was started in igneous tuffs at a point 300' lower than the old shaft and nearer the Colorado river.

Equipment includes gasoline engine, hoist, compressor, etc. Mine is temporarily closed down for lack of funds, 1913.

QUEEN BEE MINE.

COLORADO

W. O. Daniels, owner, Delta, Colo. Mine in Bowerman district, near Pitkin, Gunnison Co., Colo., not far from the Camp Bird mine. Claims show 5' vein of gold-bearing copper ore developed by 120' shaft with 90' drift at bottom. Property reported to be developing Oct., 1913, and preparing for ore shipments.

QUEEN BESS MINING CO.

UTAH

Idle. Letter unclaimed at 190 South West Temple St., Salt Lake City, Utah. Mine at Brighton, Salt Lake Co., Utah. Alexander Rogers, pres.; Edw. McGurrin, vice-pres.; W. W. Rogers, sec.-treas., at last accounts. Organized Oct. 3, 1905, under laws of Utah, capitalization \$500,000, shares \$1 par, assessable. Lands, 3 claims, patented, 20 miles from a railroad, having a 200' shaft and 600' of tunnels, show lead and copper ores.

QUEEN COPPER MINING CO.

ARIZONA

Mine office: Superior, Pinal Co., Ariz. A. M. Crawford, pres.; Richard Fleming, vice-pres.; E. F. Kellner, Jr., sec.-treas.; preceding officers, W. D. Fisk and Geo. Gausler, directors. Organized 1906, under laws of Arizona, capitalization \$5,000,000, shares \$1 par, nonassessable; issued, \$3,875,000. Annual meeting, first Thursday in September. The company owns the Queen, or Silver Queen mine, now under bond to the Magma Copper Co. and described under that title.

QUEEN MINING CO.

NEW MEXICO

Idle. Office: Galveston, Tex. Mine at Cooney, Socorro Co., N. M. Edw. Randall, pres.; Geo. Sealy, vice-pres.; Harry A. Griffin, sec.-treas.; preceding officers, B. Adone, John Sealy and Hampton Young, directors; Wm. J. Weatherby, agt. and engr. Organized Nov. 21, 1895, under laws of Texas, capitalization \$100,000, shares \$1 par, nonassessable.

Lands, 5 claims, 90 acres, 55 patented, known as the Copper Queen group, also a 5-acre mill site. Claims show fissure veins between rhyolite and andesite, having a generally N.-S. strike. The mine has about 3,000' of workings, developing a considerable tonnage of low-grade auriferous and argentiferous copper ore. Equipment includes steam power and a 15-stamp mill.

QUEEN REGENT MERGER MINES CO.

NEVADA

Office: Monadnock Bldg., San Francisco, Cal. Mine near Rawhide. Mineral Co., Nev. J. D. Brown, pres.; H. B. Wade, sec.; L. E. Foster, M. C. Roberts and A. M. Tridel, directors. Organized Feb., 1911, under laws of California, as successor of the Queen Regent Copper & Gold Co., capitalization \$2,000,000, shares \$1 par.

Owns 36 claims, about 5 miles S. W. of Rawhide and 18 miles east of Schurz, claimed to show a hematite gossan 50 to 300' wide, carrying copper values and said to show, in a trench, native copper of 12% tenor, with gold and silver values aggregating \$42 per ton.

The principal development is by the 400' main shaft which passed through 100' of hematite rock to 250' and thence down on a 40° granite contact. The 250' level is said to cut a 12' ledge which is 33' wide on the 300' level. On the 400' level, a 75' crosscut is said to be in ore. A raise from this level and drifting on the 300' are reported to have disclosed a large body of low-grade ore. Property regarded as promising.

QUEEN VICTORIA MINE.

BRITISH COLUMBIA

Owned by British Columbia Copper Co. Described Vol. VIII.

QUILILLA; CIA. EXPLOTADORA DE LA

MINA DE COBRE.

MEXICO

Letters unclaimed at former mine office: Ameca, Jalisco, Mex., and

Scranton, Pa. Chas. S. Weston, pres.; John W. Fowler, sec.-treas.; Independence Grove, gen. mgr.; Felix Orozco, supt., at last accounts.

Property, 50 hectares, shows fissure veins in porphyry, 1 of which, of 4 to 6' average width, is developed by 5 shafts of 40 to 190' depth, and 5 tunnels, longest 460'. Ores give average assays of 9% copper, 10 to 25 oz. silver and \$3 gold per ton.

QUINBY MINING CO.

CALIFORNIA

Mine office: Quinby, Trinity Co., Cal. Lands, 6 claims, on Quinby creek, carry a 4 to 6' vein, developed by 100' and 120' tunnels, with about 1,000' of workings. Claims show quartzose ore with chalcopyrite, associated with pyrite. The upper portion of the vein is oxidized, leached and copper is redeposited as chalcantite. Equipment includes a small gold mill. No returns secured.

QUINCY MINING CO.

MICHIGAN

Office: 32 Broadway, New York. Mine and works office: Hancock, Houghton Co., Mich. Wm. Rogers Todd, pres.; W. Parsons Todd, vice-pres.; Jas. L. Bishop, Chas. J. Devereaux, Isaac H. Meserve, Wm. B. Belcher, John M. Longyear and Otto Kirchner, directors; W. A. O. Paul, sec.-treas.; F. J. McLain, asst. sec.-treas.; Chas. L. Lawton, gen. mgr.; Jas. W. Shields, mill supt.; Alex. Laist, smelter supt. Organized March 30, 1848, under special charter from the state of Michigan. Present capitalization \$3,750,000, shares \$25 par; issued, \$2,750,000. Original capitalization \$500,000; reincorporated March 6, 1878, for 30 years more with capitalization \$1,000,000, increased, 1889, to \$1,250,000, again increased, 1896, to \$2,500,000, and once more increased, 1906, to \$3,750,000. Reincorporated 1908 for a third term of 30 years. Company ended 1912 with balance of assets of \$1,233,278. Old Colony Trust Co., Boston, transfer agent. Shares are listed on the Boston Stock Exchange. Annual meeting, first Wednesday in June.

The Quincy paid its first dividend in 1862, and profits have been disbursed to shareholders in every succeeding year except 1866 and 1867, giving the company a continuous dividend record of 45 years, from 1868 to date, rendering it the oldest dividend-paying American copper mine, and second only to the Tharsis Sulphur & Copper Co., Ltd., which has a record of continuous dividends since 1867, or 1 year longer than the Quincy's record. Recent dividends, by years, have been as follows: \$550,000 in 1903; \$500,000 in 1904; \$600,000 in 1905; \$1,250,000 in 1906; \$1,350,000 in 1907; \$495,000 in 1908; \$440,000 in 1909; \$550,000 in 1910; \$440,000 in 1911; \$550,000 in 1912, and \$412,500 to Oct. 1, 1913, a total of \$20,842,500. A table of statistics, production, costs, etc., 1864-1905, is given Vol. X.

Lands are very extensive, the management having adopted the policy, many years ago, of expansion of territory as opportunities offered. Recent landed acquisitions included a purchase of the Arcadian Copper Co., 1907, at a price of \$750,000; the purchase of the old Franklin mine, 1908, at a cost of \$170,000, and the acquisition, 1910, of Sec. 14 and the N. E. $\frac{1}{4}$ of Sec. 22, of 800 acres, from St. Mary's Mineral Land Co. bought for \$600,000. The holdings of the Quincy now include lands formerly held by the Pewabic, Franklin, Mesnard, Pontiac, Arcadian and St. Mary's, in order named, from south to north. The property carries the Pewabic bed and a number of parallel copper-bearing amygdaloids, from the Hancock mine, on the northern shore of Portage lake, to the boundary of the Franklin Junior mine, or about half-way from Hancock to Calumet. Through the acquisition of new territory, shafts Nos. 2, 6 and 8 can be sunk to practically unlimited depth and Mr. Lawton estimates that the property now includes, on the Pewabic bed alone, more than 3 times the quantity of copper rock that has been stoped during more than half a century of active mining in the past. The

mine was opened 1848, on the Quincy amygdaloid, a bed lying some distance west of the Pewabic, but the Quincy bed was abandoned 1856, when the Pewabic amygdaloid was opened. There is a footwall branch, known as the Pewabic East lode, underlying and parallel with the main bed, which occasionally yields good returns. The so-called West lode, about 300' west of the Pewabic bed, has been opened by shafts Nos. 4 and 7 through cross-cuts on the 30th, 39th, 40th, 44th and 49th levels, and considerable stamp rock has been stoped therefrom. About 150' west of the West lode is another amygdaloidal bed averaging about 40' in width and carrying more or less copper, which probably may prove workable at some future time. About 1,000' west of the Pewabic bed is the Hancock amygdaloid, which is narrow but fairly mineralized, and which yielded an average of 21 lbs. fine copper per ton, after reasonable selection, when worked in the old Hancock mine, this figure being materially above the present average return from the Pewabic bed.

The Pewabic amygdaloidal bed, on which all shafts are sunk, has a strike of about N. 30° E., with an average dip of 52 to 54° at surface, flattening in the lowest workings at depth of more than a mile to approximately 37° 30', the shafts following the dip of the bed on catenary curves. The Pewabic averages about 20' in width in the upper workings and has an extreme width of 40' at various points, but is materially narrower at the bottom and is only 10 to 15' wide in the upper workings of No. 8 shaft. The lower workings show decreased copper values with much less heavy copper than above, but the ore is more uniform in value. Part of the decrease in copper returns is due to mining rock that formerly would have been left as worthless and practically the entire Pewabic bed is now mined. There are copper courses, or shoots, that rake to the north with depth.

The Pewabic bed has good walls and the mine requires comparatively little timbering. Dry-walls are built of waste rock, in wide stopes, saving the expense of hoisting waste and also the cost of timber. Shafts are sunk mainly in the footwall, obviating the necessity of leaving large quantities of payable stamp rock in the pillars. The Pewabic rock now runs 15 to 17 lbs. fine copper per ton, with appreciable silver values. Previous to about 1890, about 40% of the copper was secured in masses. In 1912 the proportion of mass copper was about 15%. The southernmost drifts of the Quincy are under the city of Hancock and about 3,000' below mean water datum of Portage lake, while the northernmost workings at No. 9 shaft are fully 2 miles from the southern breasts. New openings, 1912, were 31,405' and average about 6 miles yearly, the mine having about 100 miles of workings. Fire doors have been installed and every precaution is taken against fire. Miners are carried to and from work in man cars holding 30 men each, and hoisting cables are inspected frequently, with every care taken to prevent accidents.

The electric underground traction plant was installed by the General Electric Co., tram lines averaging about 1,800' each in length with gradients of 1.5% towards the shafts. The equipment includes 20 electric locomotives, each weighing 5,500 lbs. standing 3' high by 43" wide and 9' long, with draw-bar pull of 700 lbs. on a level track, each hauling 4 or 5 three-ton rock cars at a speed of 6 to 8 miles per hour, 1 man caring for each train. The underground traction power plant, on the 57th level of No. 2 shaft, has a 100-kw. direct-current motor operating the haulage system. Tram cars are unloaded into 500-ton storage bins, built on the hanging-wall side of the shafts, there being such bins on 2 levels of No. 2 shaft, 4 levels of No. 6 shaft and 7 levels of No. 7 shaft. This system of storage obviates the loss of time by either the tram lines or skips, and adds about 25% to the hoisting

capacity of the mine, the property being equipped with hoisting and rock-house capacity for a production of fully 5,000 tons daily. About 160 rock drills are used in sinking, drifting and stoping, and extensive use is made of the diamond drill for exploratory and preliminary development work.

The Quincy has been much troubled by air blasts, these being violent disturbances brought about by the settling of superincumbent rock in the scores of miles of worked-out openings, causing violent compression of the air elsewhere throughout the mine. The most serious disturbances from air blasts, which practically are artificial earthquakes, of local scope, felt for only a few miles distance upon surface, were experienced in Feb., 1906, and there seems reason to fear that these troubles will prove intermittently continuous for the balance of the mine's life. The air blasts, while unpleasant, have caused more alarm than damage.

Owing to the absorption of adjoining mines, the Quincy shafts are numbered irregularly and are described hereinafter in order of occurrence, from south to north, rather than in order by number.

No. 7 shaft, the southernmost, planned and sunk by Mr. John L. Harris, leaves surface at an angle of 53° and is bottomed at an angle of 37° 30'. The shaft was sunk 4,000', in 18 months, through very refractory rock, this speed being rendered possible by sinking and raising in 5 sections simultaneously. The shaft is bottomed at the 71st level, at a depth of about 5,500'.

No. 7 shaft has a steel shaft rock house, 100' high, with large wings. There are 750-ton bins. The rock house has a steam hammer and two 24x36" crushers. In 1904 this rock house required 28 men for its operation, the force being reduced 1905, by remodeling, to 16 men, while since the changes of 1907, 5 men are able to handle 1,800 tons of rock daily, where 28 men were needed, 5 years previously, to handle less than half this tonnage. It is this sort of progress that keeps the Quincy vigorous and successful in its seventh decade of active production.

No. 7 shaft has an 8,000-h. p. Allis Chalmers Corliss hoist, with 52x84" cylinders and winding drums 28' in diameter by 11' 9" face, carrying 8,000' of 1½" steel cable, the main shaft weighing 120,000 lbs. This hoist can raise 6-ton skips from a depth of 1½ miles at a speed of 3,000' per minute, hoisting being limited to this rate by an automatic cutoff which also prevents overwinding. Starting a load of 6 tons from a depth of more than a mile, the hoist, if untouched, will check without damage after raising the skip only a few feet higher than the appointed place in the shaft house. There is a 1,300-gal. bailer in addition to skips. The engine house at No. 7 shaft is 58x94' with a 56x92' boiler house adjoining, both of stone, with steel truss roofs, and there is a second boiler house, each having eight 100-h. p. Roberts tubular return horizontal boilers.

No. 4 shaft, 860' next north of No. 7, is 4,186' deep, bottomed on the 51st level. The lower stretches of ground are reached from No. 7 shaft by electric tram. Previous to abandoning No. 4 a more systematic search was made of the West lode, which was successful to the point of opening several years reserves of stoping ground of fair tenor, though below the average grade of the Pewabic bed. Surface equipment at No. 4 shaft includes air compressors of 40 drills aggregate capacity.

No. 2 shaft, 585' next north of No. 4, is bottomed on the 71st level. Equipment includes a 1,300-gal. bailer for raising water and 30 to 40 power drills are operated normally.

No. 2 shaft has a shaft rock house 160' high, of steel and reinforced concrete, built 1908, by the American Bridge Co. Stamp rock from the shaft is dumped onto grizzlies, with wide bars, smaller material falling into circular bins, whence it passes by gravity to the crushers and thence into the

main rock-house bin, which is circular, built of steel plates. The smaller mass copper passes through the grizzly bars and is picked out by workmen and dropped into a chute carrying it to a steam hammer, there also being a chute for waste rock. The grizzlies allow large pieces of rock to fall into a bin of reinforced concrete in front of the steam hammer, where broken and sent to the main rock house bin through a chute, while mass copper from the steam hammer is dropped into a steel tube leading to a circular steel bin, with bottom of steel rails reinforced by concrete, which loads into railroad cars through chutes with pneumatic gates.

No. 2 shaft has a special crushing plant for waste rock, between the collar of the shaft and the rock house. Poor rock is dumped into a circular bin and drawn by gravity to a crusher, going thence to circular storage bins, from which it is drawn off into wagons or railroad cars for use in railroad ballasting, road building and concrete work. When required, larger masses of rock are selected and stored for masonry work. There are similar crushing plants at the other main shafts, except No. 7.

The surface equipment at No. 2 shaft is very heavy, being practically a duplicate of that at No. 7, including a powerful hoist. The 53x69' compressor building, of stone and steel, with fireproof truss roof, houses two 60-drill cross-compound 2-stage condensing right-and-left-hand Corliss air compressors, so connected that air therefrom is available in any part of the mine, the cross-connection eliminating danger of inadequate air supply through disabling of either section. Steam from the compressor plant exhausts into a dam. The boiler house has 5 Hawley down-draft furnaces. A new steam power plant, to be known as No. 5, is under construction at this point and will replace the old boiler plant at No. 4 shaft.

No. 6 shaft, 1,928' north of No. 2 and only 200' south of the Franklin line, was bottomed on the 68th level May, 1913. Production has been somewhat decreased by No. 8 shaft taking considerable ground under the Franklin mine, previously tributary to No. 6. Equipment includes an Allis-Chalmers duplex hoist, with a 22' 6" straight-face drum, raising 8-ton skips and a 1,300-gal. bailer, a centrifugal feed-water heater being attached to one cylinder of the hoist. Equipment includes a 100-drill 2-stage compound air compressor. The 56x75' boiler house has four 250-h. p. Wickes water-tube vertical boilers, nine 100-h. p. locomotive firebox boilers, and a powerful fire pump.

The Franklin mine lies next north of No. 6. The Quincy bought the old Franklin mine, 160 acres, for \$170,000, taking possession Dec., 1908, and closing the mine immediately. It is doubtful if the old shafts ever will be used by the Quincy. No. 3 Franklin shaft is 3,200' deep, bottomed at the former boundary line with the Quincy, and was a scam for some years before taken over. No. 5 Franklin shaft, 2,850' deep, also is bottomed at the former boundary line. Some fair stopes were opened, 1905, on the West lode, through crosscuts from this shaft. Idle since taken over by the Quincy.

The Mesnard shaft, No. 8, is 4,168' north of No. 6, and was bottomed at the 56th level May, 1913, at a depth of about 5,700'. Levels in this shaft have been opened uniformly at 135' intervals and former numbering made the 24th level of No. 8 correspond with the 42d level of No. 6. This lode was poor in the upper levels, but the lower workings, while by no means up to the Quincy average of some years ago in either quantity or quality of ore developed, show a bed wider and better mineralized than above, and the ground is of very satisfactory and profitable average, the improvement that began on the 10th level being very marked below the 20th level. The present average of the lode at the Mesnard shaft is nearly or quite up to the present average of the older workings, the 2,000' level showing a marked im-

provement above the general average for the Mesnard workings. This shaft is connected with the workings to the south on each level from the 42d, which was the first to pass under the old Franklin mine, to the 49th, inclusive. Regular production was begun 1907, and this is now the main shaft of the mine, with a normal output of 1,600 tons daily and a record production of 2,100 tons in a single day.

The shaft rock house at No. 8, of frame and structural steel, is 41x155' on the ground and 150' high. Stamp rock is dumped from the skips, as hoisted, upon grizzlies of 2" steel bars, spaced 2" apart, at an angle of 45° in an upper section, with a lower section at 20° only, in which bars are spaced 12" from center to center, this combination grizzly assorting rock automatically into 2 grades, fine stuff going to ore bins and the coarse material falling into 2 chutes, receiving equal portion, which feed direct to 2 rock crushers on the floor below, no shoveling being required. Rock too large to pass the 10" aperture in the lower section of the grizzly falls to the floor and is broken by a trip hammer. The grizzlies save one-half on rock-house labor, and greatly lighten the work of the remaining employees.

The power house at No. 8, of structural steel and brick, is 140x162' in size, with a 9' basement under the engine room. There is a Nordberg 32x72" duplex-cylinder engine, with double-conical drum, of 12' 6" minimum and 18' 6" maximum diameter, good for 6,000' depth. In a wing, on the southern side of the power house, is a 65-drill Nordberg 2-stage cross-compound air compressor. The boiler room has ten 250-h. p. Parker and Burt boilers, with steel and brick coal bins that have direct rail connection over a trestle, and a 140' reinforced concrete smokestack standing on a 16' base. A large changing house of reinforced concrete was built, 1910, at this shaft, and many well-built houses were constructed for employees.

No. 9 shaft, 2,600' north of No. 8, is the old 100' Pontiac shaft, given a concrete collar and cut down to 3-compartment size. The shaft was about 2,635' deep Dec. 31, 1912, and at 2,600' cuts a drift from No. 8, giving ventilation. No. 9 shaft gave a promising showing at a comparatively shallow depth. Equipment includes a temporary shaft house, with a hoist and boiler plant.

To the north of the Pontiac shaft there is a long stretch of ground, bought of the Arcadian Copper Co. and St. Mary's Mineral Land Co., carrying the extension of the Pewabic bed and available for later development.

The surface plant of the Quincy is very complete. The 62x145' fireproof machine shop, near No. 2 shaft, is built of stone, brick and steel, with truss roof, and has a traveling crane running the entire length of the shop. A plastered brick tunnel, connecting the machine shop, compressor plant and boiler house, serves as a conduit for steam and air pipes. The blacksmith shop is 50x154', with a 50x90' wing and fireproof steel truss roof having 3 large ventilators, and is equipped with 12 forges, steam hammer, fans, bolt cutters, drills, etc. There also is a well equipped carpenter shop. All shops have electric motors.

Miscellaneous buildings at the mine include a large warehouse. The general office is a handsome and substantial 2-story and basement building, of ashlar-finished redstone. The company owns several hundred dwellings at the mine location and a considerable number of houses at the mills. The new houses are of 7-room size, on solid stone foundations, and the mine and mill locations are exceptionally neat and attractive.

The Quincy has extensive holdings of valuable land, in and adjoining the city of Hancock, and portions of this land have been platted, from time to time, for residence purposes and sold at good prices.

Water for boilers and potable use at the mine location is taken from

Portage lake, the pumping station, on the margin of the lake, being of ashlar-finished redstone, the pumps forcing water for a mile against a static head of 640'. A large coal yard is located between shafts Nos. 2 and 4.

A private telephone exchange, with the central station in a 20x25' frame building, has a switchboard for 100 instruments, with telephones installed in the shops, mills, smelter and mine, there being about 60 underground stations.

The company's private rail line, known as the Quincy & Torch Lake, built 1890, is 6 miles long, touching at all shafts and shops at the mine and at the boiler house, wharves and coal sheds at the mill. This line is connected with the Mineral Range, Hancock & Calumet and Copper Range railways. The line has solid rock ballasting, and steel bridges, with a continuous down-grade haul between the mine and the mill. Equipment includes 6 locomotives, freight cars and nearly 150 hopper-cars for rock, the latter having automatic couplers and air brakes. The roundhouse, near No. 7 shaft, has a 36x40' addition containing a special machine shop, with electric power, for the use of the railway only.

The mills at Mason, on Torch lake, 6 miles from the mine, have 8 stamps, formerly with 20" cylinders, having a combined capacity of about 4,500 tons daily, but all have been given 24" cylinders, increasing the capacity of the mill to about 5,500 tons daily, the stamps giving an average duty of about 700 tons and occasionally reaching 800 tons. While under test, 1 head stamped 865 tons of rock in 24 hours, oversize being handled in another head, equivalent to handling the oversize in rolls, as is done generally in the case of compound stamps. The results secured at the Quincy mills reflect great credit upon Superintendent Shields.

No. 1 mill, of wood, has 5 Allis-Chalmers 2-way stamps, taking steam at 100 lbs. pressure. There is an Allis-Chalmers Huntington mill for regrinding raggings, and the dressing machinery includes 92 Hodge jigs, and 32 Wilfley tables.

No. 2 mill, standing 630' north of No. 1, is 132x216' in size, of steel on stone foundations, with 180 windows, each having 13½ sq. ft. of glass, flooding the interior with light. This mill has 3 Allis-Chalmers heads, each set on foundations of heavy timbers and concrete, surmounted by a bottom plate of 22 tons, a middle plate of 18 tons and a top plate of 18 tons, all of solid iron castings, above which are the mortar boxes of the stamps. One head was remodeled as a steeple-compound stamp in 1905, and was carefully tested, the water condensed from steam used being weighed, giving a close check on the duty of the engine. The result of the very careful tests made decided the management to stick to simple heads. The stamps have 1" revolving screens for the mortar boxes, with hydraulic discharges, as have the launders leading from the mortars, these yielding about 60% of the copper secured. Finishing jigs and slime tables have been replaced by 24 Wilfley tables, 8 for each stamp, assisted by 3 Standard concentrators. Each stamp has 12 rough jigs, and 6 Wilfleys for finishing and 2 Wilfleys and 1 Standard table for slimes. There is a settler from which slimes are taken to the Wilfley tables. Regrinding is done by a Trent Chilean mill, with 3 jigs and 3 Wilfleys as auxiliaries. By the adoption of hydraulic discharges and other improvements the capacity of the stamp-heads has been increased about 25%, while changes in the wash have given an increased capacity of 30%, with labor costs reduced 25% and loss in tailings cut down 40 to 50%. About 35% of the present product of the mill is No. 3 grade mineral, carrying very fine copper.

The mineral bins, of concrete and cement, are kept at a temperature of 80° F., to dry out water remaining from the wash, and gates are operated

by steam pistons. Mineral is received in buckets by overhead trolley from No. 1 mill, and in hopper cars drawn by an electric locomotive traversing a 650' track from No. 2 mill. There is a 54' platform scale, with a minimum of 10 lbs. and maximum of 220,000 lbs. weighing capacity.

The 56x90' mill power house, of steel frame, on stone foundations, at No. 2 mill, has four 250-h. p. Wickes vertical water-tube boilers, with a 100' smokestack on a 30' foundation. There is an electric light plant.

The 54x54' brick and steel mill and pump house has a 20,000,000-gal. centrifugal pump and a 20,000,000-gal. Allis-Chalmers vertical triple-expansion pump, and the old pumphouse has 3 pumps with combined capacity of 21,000,000 gal. daily. Water is taken from a 7x7' 6" tunnel, driven 100' under the bed of the lake. A 6x6' 6" tunnel 440' long, connecting the mills, boiler houses and pump houses, is bricked and plastered inside and carries both water and steam pipes.

Minor structures at the mill include a machine shop, warehouse and other buildings. A considerable village, tenanted solely by employees, has grown up about the mill.

The tailings at the mills are very extensive, including millions of tons of stamp sand, and various experiments on reconcentration have been conducted by different interests at intervals since 1902. The companies that have attacked this proposition have bankrupted themselves with monotonous regularity, notwithstanding which, the successful results being secured at the regrounding mills of the Calumet & Hecla offer promise that the Quincy sands also may be retreated profitably at some future time.

The Quincy has 3 docks, the one at Hancock having a 40x416' wharf, and a 64x124' warehouse, with deep water in front and railroad tracks behind. A second dock, at the Ripley smelter, has a 350' shipping wharf for copper and a 250' coal wharf. The third dock, at the Torch lake mills, has a 40x400' wharf, built of Washington fir, with 18' of water alongside, on it standing a 300x300' coal shed of steel with corrugated iron siding and roofing, having storage capacity for 80,000 tons of bituminous coal, this being about the annual consumption of the mine and mills. There are 3 steam coal hoists, each capable of unloading 100 tons per hour, these having 120' steel towers, traveling on a track 22' wide and 300' long that runs the entire length of the shed. The plant was built by the American Bridge Co. at a cost of about \$200,000 and effects a saving of about 12 cts. per ton on all coal used. The railroad reaches the coal shed by a 650' trestle, partly of timber and partly with steel bents, supported on 240 concrete piers.

The smelter, blown in Dec. 1, 1898, is at Ripley, on the shore of Portage lake, opposite Houghton, just east of Hancock and only a half mile from the mine, and does a custom business, treating the mineral of the Franklin and Mass mines, in addition to that of the Quincy. The principal buildings are of ashlar-finished redstone.

The 40x95' mineral house is reached by a 460' trestle, mineral arriving from the mills in hopper-bottom cars, and being dumped into storage bins, whence drawn off, as required for smelting, into steel trucks running on rails under the gates of the bins.

An 84x144' building has four 40-ton reverberatory furnaces, and a second building, erected 1904, has 60-ton and 120-ton reverberatories, latter installed 1910, this building having an automatic casting machine. On arriving at the reverberatory building the trucks carrying mineral are lifted by electric cranes and contents dumped into the furnaces, which are top-charged. An overhead trolley in the main building permits handling large bars and cakes, and a trolley dipping system is used for casting. Slags are trammed, in 3,000-lb. pots, to a 30' hydraulic elevator which raises the lodes and dumps

their contents over the end of a trestle. The cupola building has 1 blast furnace only, for reverberatory slags. A briquetting plant, of concrete blocks, built 1906, has 2 boiler-iron retorts, each 6x31', for briquetting low-grade mineral before smelting. Miscellaneous buildings at the smelter include an engine house, casting house, cooper shop, office, laboratory, machine shop, 50x100' warehouse, and a coal shed.

In 1912 the Quincy stamped 1,309,253 tons of rock, returning 30,040,360 lbs. of mineral that yielded 20,634,800 lbs. fine copper, giving the mineral an average tenor of 68.6% copper, with an average return of 15.76 lbs. fine copper per ton of rock stamped. As 15% of the copper production of 1912 was in mass copper, the actual returns per ton of rock stamped would appear to have been 13.3 lbs. per ton. Average cost per ton of rock stamped was \$1.51 per ton for the first 7 months of 1908, and was \$1.75 per ton in 1912, the cost per ton having been lower in 1912 than in 1905, when hoisting was done from shallower depth and the rock produced carried a higher percentage of copper. Costs were 11.2 cts. per lb. of copper, or 12.2 cts. per lb. including construction, in 1907, and were 11.3 cts., or 11.8 including construction, in 1912. Silver production averages about 100,000 oz. yearly.

Production has remained nearly constant for several years but was seriously lessened by the labor strike of 1913, output for September and October being but one-fifth the normal amount. Production was 16,924,618 lbs. fine copper in 1897; 16,354,061 lbs. in 1898; 14,301,182 lbs. in 1899; 14,116,551 lbs. in 1900; 20,540,720 lbs. in 1901; 18,988,491 lbs. in 1902; 18,498,288 lbs. in 1903; 18,343,160 lbs. in 1904; 18,827,557 lbs. in 1905; 16,194,838 lbs. in 1906; 19,799,973 lbs. in 1907; 20,600,361 lbs. in 1908; 22,511,984 lbs. in 1909; 22,517,014 lbs. in 1910; 22,252,943 lbs. in 1911, and 20,634,800 lbs. copper in 1912.

The policy of growth, begun with the purchase of the Pewabic mine 20 years ago, has been continued steadily and the management is entitled to credit for following unswervingly the policy of expansion that is necessary to the successful operation of any large industrial enterprise of the twentieth century. The Quincy, with the longest record of continuous annual dividend payments of any American copper mine, bids fair to continue disbursing large profits for at least another generation or two.

QUINTERA MINING CO., LTD.

MEXICO

London secretary and office: J. G. Mil's, 8 Crosby Square, London, E. C., Eng. Paris office: 11 rue Boudreau, Paris, IXe, France. Mine office: Aduana, Alamos, Sonora, Mex. Jacques F. Kulp, chairman; preceding officer, A. Dubois, S. Einhorn and Ernest May, directors; J. Hebert, gen. mgr.; Miguel Valenzuela, supt.; L. Le Bouticaud, mill supt.; Francisco A. Esquer, smelter supt. Organized May 4, 1888, under laws of Great Britain, capitalization £52,000, increased Nov. 18, 1901, from £40,000, shares £1 par, fully paid; all issued. Dividends were 25% in 1900; 22.5% in 1901; 17.5% in 1902; 17.5% in 1903; 7.5% in 1905; 11.25% in 1906, and 5%, or 2s. 3d. in 1907; none since. Annual meeting in June. Shares listed on the Paris coudisse. Accounts for calendar year 1911, submitted July 8, 1912, showed £966 loss; total deficit, Jan. 1, 1913, £17,559; reserve fund, £26,623. Operations suspended since 1911, owing to Mexican revolutions.

Property consists of 26 claims, 134 hectares, in the Alamos district, Sonora, and in the Fuerte district, state of Sinaloa, Mex., with ranches of about 7,400 acres. The mining property consists of 4 groups, the Quintera and Libertad forming the first, the Azulaques and Constancia the second, the Minas Nuevas, Cotera and Porvenir forming the third and the Rosario group the fourth. Only the Quintera has been worked by the present owners.

Some 40 or 50 years ago a Frenchman owned this and the Rosario, a lead-silver property on Rosario mountain, where the states of Sonora, Sinaloa and Chihuahua touch. He had worked the Rosario extensively, the ore being a lead carbonate containing much silver, and finally went to Paris, mortgaged both properties to the Egyptian-Paris Bank for \$250,000 and skipped out to South America. He has never been heard from since. After the bank acquired the properties, for many years they sent engineers out each year to examine and report. Finally, about 30 years ago, after several had reported favorably upon the Quintera, work was commenced.

The vein is strong on the surface, 18 to 20' wide, and has granite on the east and dark andesite on the west. It showed low silver values on the surface and 2 to 3% lead. With depth the value of the ore improved and under the efficient management of Tom Clark, a Cornishman, the mine paid \$50,000 to \$100,000 yearly in dividends, notwithstanding that the general mill management was expensive.

The ore is 20 to 30' wide in the deeper levels and assayed 40 to 50 oz. in silver, the lead being replaced by 8 to 9% copper ore as depth increased. This copper ore was sorted out and smelted on the ground, using mesquite charcoal at a cost of one-half cent per pound. The mine is on a hill 700' above the mill, and an aerial tram was put in to bring the ore to the mill. A new shaft 500' deep was sunk at the north end of the property, from which a drift was driven 1,300' south and a winze sunk, ultimately to a depth of 1,000' below the surface. All of the ore from the new shaft was hoisted twice and trammed 1,300', when an adit from the mill 2,000 to 2,500' long would have tapped the winze 200' below the long drift, and the ore could have been trammed in cars direct to the mill. Even when the new shaft was sunk from the surface, this was done near the old one, instead of raising from the winze on the 500' level. At the 1,500', the vein split. One branch was followed to the east in the granite; it contains no ore of value. A few hundred feet north of the shaft the main vein enters the granite on both sides and becomes barren. At the south end of the property the ore shoot appears to be dipping into the Promontorio. Property considered valuable, but in a remote section that is without even wagon roads, and mine is impossible to operate until peace is restored to the country.

RADIUM COPPER MINING CO.

COLORADO

Idle. Letter unclaimed at 428 Boston Blk., Minneapolis, Minn. Mine office: Radium, Grand Co., Colo. H. L. Hill, pres.; Walter H. Gould, vice-pres., treas. and gen. mgr.; L. J. Van Fossen, sec.; Antonio Cunha, supt., and Chas. F. Potter, directors, in 1911. Organized 1906, under laws of Colorado, capitalization \$1,500,000, shares \$1 par, nonassessable; issued, \$800,000.

Lands, 12 claims, in the Red Gorge district, show veins developed by 2 tunnels with about 700' of workings. The upper tunnel shows malachite and chalcocite, giving assays of 5.82 to 45.7% copper, from a trace to 5 oz. silver and from 20 cts. to \$5.90 gold per ton.

RADIUM MINES CO.

ARIZONA

Mine office: Globe, Gila Co., Ariz. Lands, 60 claims, 4 miles north of the Old Dominion, in a block of 1 to 2 miles width and nearly 4 miles length, running eastward from Pinal creek. Ten or more of these claims are said to have produced \$10,000 to \$20,000 each from surface ores raised by hand windlasses.

Property shows well-defined veins characterized by vanadinite, a lead-vanadium ore, and carrying a little copper in some parts of the property. The claims are expected to develop copper ore in depth, but as the rock

is diabase, disseminated ores can scarcely be expected and veins will probably carry mixed sulphides.

RAINBOW LODGE DEVELOPMENT CO.

MONTANA

Office: 1500 Alworth Bldg., Duluth, Minn. Mine office: 14 West Granite St., Butte, Mont. Edward C. Congdon, pres.; Chester A. Congdon, vice-pres.; Frederic R. Kennedy, sec.; Edward J. Maney, treas.; preceding officers, Thomas F. Cole, Joseph B. Colton, Ralph C. Lupton, directors. John D. Pope, gen. mgr.; N. B. Brady, supt. Organized Nov. 9, 1912, under laws of Delaware, capitalization \$800,000, shares \$10 par; issued, \$560,000 for purchase of properties. Annual meeting, first Tuesday in June.

Property, 7 claims, including the Third, Sphinx, Michigander, Morel, Valley Queen, Cornbrea and Wanda claims, with fractional interests in the Sarah claim and Glendale placer. The group lies east of the Butte & Superior property and is supposed to carry an extension of the Rainbow lode. Company is sinking a shaft on the Sphinx claim which was 750' deep in Oct., 1913. A 496' crosscut on the 600' level, showed 375' of leached lode matter. Company has also acquired control of the Butte & London property under an agreement to deepen the 1,130' shaft of that company 500', crosscutting on the 1,630' level the entire width of the property to develop the veins at that depth. In return for this it receives 51% of the Butte & London stock.

Company is in the hands of very strong and able mining people and local management is skillful and has made a great record in the North Butte mine.

RAINBOW MINING CO.

UTAH

Office: 1602 Walker Bldg., Salt Lake City, Utah. Mine near Alta, Salt Lake Co., Utah. A. F. Jacobson, vice-pres.; Ernest M. Fowler, sec.-treas.; preceding officers, Eb' Crouch and Wm. Wonnacott, directors. Organized Aug. 25, 1906, under laws of Utah, capitalization \$50,000, shares 10 cts. par, fully paid; issued \$35,021, with assessments of 1½ cts. per share, to Dec. 31, 1912. Annual meeting, second Monday in January.

Lands, 14 claims, 6 patented, 280 acres, in the Little Cottonwood district, show fissure and contact veins in granite and limestone, carrying ore assaying up to 25% lead and 500 oz. silver per ton, and a vein under development, of about 12' average width, is estimated by the management to carry ore averaging 2% copper, 25% lead, 17% molybdenum, 30 oz. silver and 60 cts. gold per ton. Development is by a 350' tunnel, expected to cut the main vein at about 450'.

RAINBOW MINING & MILLING CO., LTD.

IDAHO

Office and mine: Wallace, Shoshone Co., Idaho. Hon. Herman J. Rossi, pres.; Henry C. Adami, vice-pres.; Geo. Austin, sec.-treas. and gen. mgr.; preceding officers, John D. Caughell and A. H. Nourse, directors. Organized June, 1907, under laws of Idaho, capitalization \$300,000, shares 25 cts. par, assessable; issued, \$250,000. Annual meeting, June 1.

Lands, 11 claims, unpatented, 220 acres, in 2 groups. The original group of 7 claims, in the Evolution district, near the Grey Copper mine, has St. Regis and Burke quartzite similar to the Coeur d'Alene region, cut by a 1 to 12' fissure vein running north 15° E. and traceable 1,800'. This vein carries gray copper ore with iron and quartz gangue, with an average of about 2 to 3% copper and 8 to 10 oz. silver per ton. The mine is developed by 3 tunnels, No. 1 of 110', No. 2 of 80', and No. 3 of 1,250'.

The second group, of 4 claims, bought 1910, is about 3 miles from the Handspike mine, and 15 miles from a railway, at the mouth of Bootjack creek, a tributary of the North fork of the Coeur d'Alene river, in Secs. 23 and 24, T. 31 N., R. 1 W., in an unorganized district. This property shows

a vein of 12' estimated average width, traceable 6,000', carrying lead and copper ore, associated with iron carbonates, in a quartz gangue, developed by tunnels of 30', 30' and 100'.

Improvements include 5 buildings and an air compressor on No. 2 group.

Property is three-fourths mile from O. W. R. & N. R. R. Company is developing steadily.

RAINBOW MOUNTAIN MINING CO.

ARIZONA

Mine at Chloride, Mohave Co., Ariz. H. L. McCarn, gen. mgr. Property said to show a vertical vein developed by a 500' shaft in 1912, where much water was encountered. Shipped 1,000 tons of copper in 1913 to Needles smelter. Equipment includes an 80-h. p. hoist and a 2-mile aerial tram.

RAINY DAY GROUP.

ARIZONA

Address: Louis La Barr, Copper Basin district, via Harrington, Yavapai Co., Ariz. Property has a 4' vein in mineralized schist, carrying gold-copper ore. Development consists of a 300' tunnel with 225' back. Was under development in Sept., 1913.

RAINY HOLLOW COPPER MINES.

BRITISH COLUMBIA

Location, 50 miles by wagon road from Haines, Alaska, on headwaters of the Klehini river, tributary to the Chitina. The district is 10 miles west of the Alaskan border. Copper ores occur as bedded deposits in almost flat limestones and as veins accompanying igneous dikes at the Custer mine. The bedded deposits show bornite in a garnet-calcite gangue of contact metamorphic character.

A 30-ton shipment from the Maid of Erin mine to the Puget Sound smelter returned 32.17% copper with 55.67 oz. silver per ton. A 25-ton shipment from the Copper Butte mine returned 25.36% copper and 42.07 oz. silver per ton.

RAMBLER COPPER & PLATINUM CO.

WYOMING

Office: 710, 145 La Salle St., Chicago, Ill. Mine address: New Albany, Albany Co., Wyo. Frank M. Wootton, pres.; Edw. White, vice-pres.; Dorchester Mapes, sec. Organized Jan. 21, 1908, under laws of Wyoming, as a merger of the Rambler Mining & Smelting Co., and New Lincoln Copper Co., capitalization \$2,500,000, shares \$1 par; issued, \$2,029,463.

Property leased for 15 years, in 1912, to J. Thielman of Merrill, Wis., who transferred the lease to a new corporation called the Platinum Mining & Milling Co. (which see).

Lands, 12 claims, patented, at the head of Douglas creek, on the crest of Medicine Bow mountains. The mine shows gneiss and felsite, with a fracture zone in granodiorite, having a N.-S. strike and dip of 65° E., estimated by the management to average 70' in width, with length of 90', carrying a great variety of copper minerals, associated with sundry rare metals in commercial qualities, and comparatively free from bismuth, antimony, arsenic and other deleterious elements. Ores include chalcocite and covellite, with some chalcopyrite showing in the bottom workings. The mine is especially notable for containing large quantities of covellite carrying gold, iridium, osmium, palladium and platinum, latter in the form of sperrylite. The ores have a decomposed granite gangue, giving talcose alteration products, and carry more or less hematite, pyrite and marcasite, the iron minerals carrying small quantities of copper. Ores are estimated to average 4% copper, 1 oz. silver and \$2 gold per ton, with variable quantities of the rare metals.

Development is by vertical shafts of 95' and 166', with about 5,000' of workings. The 1911 management estimated 150,000 tons of ore in sight.

Smelter returns, from carefully-selected ore, have ranged 20 to 30% copper, and Rambler matte has given assays of 6.75 oz. silver, 2.25 oz. gold and platinum combined, and 6 oz. palladium, per ton. The cost of refining the matte and separating the various rare metals was estimated, by the old company as \$40 per ton of copper, or 2 cts. per lb.

Equipment includes a 200-h. p. steam and electric plant with 2 hoists.

RAMÓN CORONA; COMPAÑIA MINERA.

MEXICO

Office: San Pedro, Coahuila, Mex. Mine office: Naica, Camargo, Chihuahua, Mex. D. Francisco I. Madero, Sr., pres., at last accounts. Geo. Stenson, mgr. Property, adjoining the Naica mine, carries considerable bodies of silver-lead and copper ores, and production has been mainly silver-lead ore. Development is by shaft. Has gasoline power. Owing to complicated revolutionary activities in this district, it is impossible to get information or to say whether the Madero family still own the property or not.

RAMSHORN MINE.

IDAHO

At Bay Horse, Custer Co., Idaho. Presumably belonging to Idaho Mining & Smelting Co. Is the largest and most extensively developed dry-silver ore mine in Idaho. Shows well-defined fissure veins in black altered slate of igneous material. Vein varies from a few inches to several feet in width and carries quartz and spathic iron with ore shoots containing streaks and spots of tetrahedrite carrying 25% copper and 1,000 oz. silver.

RANSON COPPER MINING CO. OF ONTARIO, LTD.

ONTARIO

Idle. Office: Sault Ste. Marie, Mich. Mine office: Sault Ste. Marie, Algoma Ont. B. Frank, pres.; David Rustander, sec.; D. J. Ranson, supt., at last accounts; R. H. Taylor, cons. engr. Organized 1902, under laws of Ontario, capitalization \$3,000,000, shares \$1 par. Lands, 3,600 acres, in Chesley and Anderson townships, said to show 14 veins, of which 6 contact veins have been opened by 8 shafts of 23' to 75' depth, veins averaging 25' width and giving assay values up to 12% copper and 3 oz. silver per ton, from chalcopryite. Has steam power.

RARITAN COPPER WORKS.

NEW JERSEY

Owned by International Smelting & Refining Co., at Perth Amboy, N. J. A. C. Clark, supt.

RARUS GROUP.

ALASKA

Situated on the Kuskulana river near the end of Copper River railroad. Belongs individually to owners of the Alaska Consolidated Co. Alfred B. Iles, manager. Property shows an iron outcrop, 400' wide, lying between limestone and conglomerate. Is developed by 100' tunnel, driven in 1912.

RAVEN COPPER CO.

MONTANA

Office: Hartford, Conn. Mine office: 56 Silver Bow Blk., Butte, Mont. E. C. Frisbie, pres.; John Berkin, vice-pres. and gen. mgr.; J. A. Poore, sec., Butte, Mont.; Robt. A. Griffin, treas.; preceding officers, E. J. F. Rea, Ezra A. Stack, Donald Campbell and Albert B. Curtis, directors; Geo. A. Packard, supt. Organized July, 1909, under laws of Maine, as successor of the Raven Mining Co., capitalization \$1,000,000, shares \$1 par, assessable, 60 cts. paid; issued, \$630,000.

Company paid the old corporation \$50,000 for its property, in addition to assuming the bonded indebtedness, amounting to \$35,000, now retired, and shareholders of the old company were given the privilege of acquiring new stock share for share, on payment of 25 cts. per share, the new stock being issued as 50 cts. paid; a 15-ct. assessment was levied June 25, 1913, and stock at that time sold for 2 cts. a share. The stock of the old company was introduced to the Boston market by a stock exchange firm and went to \$8 per share, and from there back to 50 cts., when insiders unloaded on

the firm. On May 24, 1913, company is reported to have had \$9,200 cash, but operations for previous year had entailed a loss of \$62,000.

The Raven has had quite a varied history. The old company, known as the Raven Mining Co., owned the Raven claim at Centerville and a two-thirds interest in the Snoozer in the same locality, the 2 claims, however, being separated by another and independent piece of ground. The Butte Coalition owned the balance of the Snoozer, and sold its interest to the Anaconda. This company gave the Raven people permission to develop the Snoozer through the Buffalo shaft. Development work was done to the depth of about 800', and 2 fine veins were found. The taking of ore was begun on the 500' and 800' levels. Then the Anaconda claimed the veins that were being mined apexed on its own property, the La Platta, and stopped the use of the Buffalo shaft.

The Snoozer mine, to which the earlier development was confined, has 4 veins, the northernmost one in dispute as to ownership of the apex. The Snoozer had 2 shafts of 75' and 200', and 5,780' of workings. Ore produced prior to suspension, June, 1906, averaged about 30 tons daily, carrying about 4% copper, 8 oz. silver and \$1.25 gold per ton. The Snoozer has been opened on the 800', 1,200' and 1,500' levels by crosscuts from the 1,200' of the Anaconda, the 1,200' level being said to show a 4' vein carrying high-grade ore, with an increase in width of the orebody on the 1,500' level.

The Raven claim, said to carry 3 veins, has a 700' air shaft, and an incline shaft 1,700' deep in Aug., 1913., with upwards of a mile of workings. It is a silver-gold mine, yielding ore averaging about 16 oz. silver per ton, with fair-gold values. On the 900' level a crosscut shows a 25' vein, carrying a hanging-wall paystreak said to average 3.5% copper. The vein is about 30' wide on the 1,100' level, carrying ore below commercial tenor, averaging 2% copper, with small gold and silver values. Apparently the developments to Aug., 1913, are very disappointing, value in ore recently shipped being practically all silver. Equipment includes a 20x36" hoist, good for one-half mile depth and a 5-drill Ingersoll-Rand air compressor. The output for 1913 is reported to have returned \$40,000. As the pumps are pulled and the mine flooded, further working appears unlikely, as results of development do not justify levying another assessment for further exploration.

RAWLEY MINING CO.

COLORADO

Office: 55 Liberty St., New York. Mine office: Bonanza, Saguache Co., Colo. A. Fillmore Hyde, pres.; Eugene G. Foster, vice-pres.; E. V. Cox, sec.-treas.; preceding officers, John L. Cox, V. Hodges, Elmer Z. Burns and J. Hegeman Foster, directors; Will C. Russell, gen. mgr.; Chas. E. Beckwith, mine supt.; Simmons & Burns, cons. engrs. Organized 1901, under laws of Colorado, capitalization \$2,500,000, shares \$1 par, nonassessable. Annual meeting, third Monday in January.

Lands, 35 claims, 350 acres, show fissure veins in andesite. These veins run N.-S., are nearly vertical and of 5 to 6' width, carrying argentiferous galena, bornite and chalcopryrite, in a heavy sulphide smelting ore on the 12th level. The mine had 18,800' of workings, March, 1913, estimated to show 280,000 tons of ore blocked out and 500,000 tons probable ore.

Equipment includes steam power with 50 h. p. at the mine and 100 h. p. at the mill, fuel being wood; machinery includes an 8-drill Rand air compressor. There are 24 buildings and a 100-ton mill. Property is still in the development stage. The management has completed a 6,235' drainage and development tunnel said to intersect the vein on the 12th level.

RAY-ARIZONA COPPER CO.

ARIZONA

P. T. McGrath, president and manager, Kelvin, Ariz. Property, a group of 42 claims, is on the south side of the Gila river, opposite Kelvin.

Claims show schists cut by igneous rocks, with impregnations and veins carrying copper ore. Development is by a 50' shaft sunk 1912, and by churn drilling No. 1 hole 580' deep Oct. 25, 1913, showing 60' of concentrating ore. Company said to plan underground development. F. L. Underwood is reported to have financed the company under an option on 51% of the stock for \$250,000.

RAY CENTRAL COPPER MINING CO.

ARIZONA

Company conveyed by direct deed all assets to Ray Consolidated Copper Co. in June, 1912. June 1, 1913, there were still 6,040 shares of Ray Central stock unexchanged, but company will be dissolved as soon as it can be legally done.

RAY CONSOLIDATED COPPER CO.

ARIZONA

Office: 25 Broad St., New York. Mine office: Kelvin, Pinal Co., Ariz. Mill office: Hayden, Gila Co., Ariz. Sherwood Aldrich, pres.; D. C. Jackling, vice-pres. and gen. mgr.; Chas. Hayden, second vice-pres.; preceding officer, Chas. M. MacNeill, Seeley W. Mudd and A. Chester Beatty, executive committee; Eugene P. Shove, sec.-treas.; preceding officers, Spencer Penrose and W. Hinkle Smith, directors. Louis S. Cates, mine supt.; D. D. Moffatt, mill supt.; Ed. Hiatt, mg. engr.

Organized May 11, 1907, under laws of Maine, capitalization \$16,000,000, shares \$10 par; \$14,497,650 issued, June 30, 1913. Original capital \$6,000,000, increased to \$8,000,000 in 1908, increased 1909 to \$10,000,000, increased May, 1910, to \$14,000,000. The increase to \$16,000,000, March, 1912, was to provide shares for the absorption of the Ray Central Copper Mining Co., giving 1 share of Ray Cons. for 8 of Ray Central.

Reports for the half year ending June 30, 1913, show operating profits of \$1,404,634, compared with \$1,229,334 for the previous 6 months. When the mine and plant are operated at a rate of 10,000 tons per day, it is expected that the annual earnings will be about \$3,000,000 if copper averages 15½ cts.

A \$3,000,000 issue of 6% convertible bonds, due July 1, 1921, can be retired by conversion until Jan. 1, 1917, at \$20 per share, into stock. Company absorbed the Gila Copper Co., through exchange of stock, giving 1 share for 3. Company controls the Ray & Gila Valley Railroad Co., capitalized at \$2,500,000, of which \$779,000 stock is outstanding, and is held in the treasury of the Ray Consolidated Copper Co. Mercantile Trust Co., New York, and Boston Safe Deposit & Trust Co., registrars; Guaranty Trust Co., New York, and Old Colony Trust Co., Boston, transfer agents. Fiscal year, formerly ending June 30, has been changed to end with the calendar year. Shares are listed on the Boston Stock Exchange. Annual meeting, formerly held fourth Tuesday in September, has been changed to third Friday in April. Dividends of \$1.50 a year, payable in quarterly installments, began June 30, 1913.

The company having the right to retire its bonds at 110 and accrued interest, after Jan. 1, 1914, will save the dividends on the 150,000 shares for which the bonds are exchangeable if its surplus permits such retirement. It is evident therefore that a low price for stock, keeping bondholders from converting, benefits the company. A sinking fund of 10 cts. per ton of dry

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ore treated, will go into effect from 1914 to 1916, increased to 20 cts. a ton after 1916. It seems improbable it will ever be needed, as company's surplus on July 1, 1913, after deducting fixed charges and dividends, was nearly \$3,000,000.

The company owns a tract of 1,950 acres of mining claims near Ray, Pinal, Ariz., with additional holdings, including the town sites of Ray, Sonora and Kelvin, and a tract of 4,000 acres in Gila and Pinal counties, about 15 miles south of Hayden and 21 miles from the mines.

About 580 acres of the Ray property has been proven to be mineralized, and about 183 acres have been developed, with a certainty that more or less of the additional mineral ground will be found to carry workable values.

The property shows a flat orebody 150 to 400' thick, 1,000 to 3,000' wide and about 9,000' long, through the property. This zone consists essentially of a highly metamorphosed iron-stained granite, whose borders and tongues are also mineralized and cut by diabase dikes. A fault east of the orebody brings the orebody against quartzite and limestone, while unaltered schist is found to the west. The silicified and whitened rock is leached to a considerable depth, the oxidized zone being succeeded by impregnations and seams of chalcocite and pyrite. The ore deposit is almost identical with that of Miami, and genetically similar to those at Bingham, Ely and Morenci. Oxidized copper ores are found near surface, though in much of the ground the top of the belt is leached to depths varying from 30 to 400' and averaging 225', this leached zone being succeeded by ore carrying copper sulphides, greatly enriched by the secondary redeposition of chalcocite, latter constituting the main ore value. At the bottom of the orebody the transition from the ore to rock mineralized with primary sulphides takes place in a few feet. This primary mineralization averages about one-half of 1% copper, whereas an average sample of ore on the 50' level gave 2.4% copper, 3.4% iron, 2.6% sulphur and 90.3% insoluble matter.

The many drill holes bored have shown an average capping of 240' depth, succeeded by an average of 118' thickness of ore, on the Ray proper, with 315' of capping and 171' thickness of ore on the Gila ground. The Ray mine has been developed by both underground workings and extensive churn-drill borings. Six churn drills have been employed, averaging about 50' each daily, boring 340 holes to an average depth of nearly 400' each, with a total of 140,000' of drilling, holes being bored checkerboard fashion, in 200' squares.

The ore deposit is opened by the Globe and Ray, or Nos. 1 and 2 shafts, about 4,000' apart, and No. 3, the Ray Central shaft, near No. 1. There are many less important workings. The main ore supply comes from the Ray or No. 1 shaft, which is 400' deep and has 4 levels at 171' and each succeeding 100' in depth. The shafts are connected by a drift, on the second level, which is run for more than 1 mile, practically through commercial ore. By the side of each shaft is an incline shaft, with a series of stairs used by the men and a haulage way used for the handling of material, the main shafts being used solely for ore extraction. The greatest depth from which ore is to be hoisted will be about 300' for years to come, and the greater part of the tonnage will be taken from the 170' level and above for some years. The mine is operated on the Cates shrinkage-stoping system, the stopes being carried up 15' wide with 10' pillars. When the stoping is completed and ready for drawing the pillar will crush and come down with the broken ore. This method gives a 92% recovery of the ore blocked out. The ore is milled into 600-ton underground loading bins on each level of each shaft, and drawn therefrom into 12-ton skips through gates operated pneumatically. Ore is hauled underground in trains of 3-ton

cars, drawn by 10-ton electric locomotives through the 4,000' 8 x 14' double-track main haulage tunnel, with which all shafts and working levels are connected. Three cars will be dumped at a time into each ore pocket, by a revolving tripper.

The Ray mine, of which the Ray Central or Globe-Isabella mine is now an integral part, has been developed for a maximum width of 3,500' and length of 8,000'. Total underground workings, in 1913, amount to about 54 miles of underground workings, all driven in 2½ years, constituting a world's record of rapid mining development. On Aug. 20, 1913, the property had proven 77,314,470 tons of 2.17% ore in the original Ray Gila ground plus 5,589,898 tons of 2.51% Ray Central ore. This includes 446,000 tons of 5.3% Ray Central ore. The total ore developed to date is 82,904,368 tons, averaging 2.19% copper, from which about 3,372,477 tons of 1.72% ore has been mined.

Known reserves, Dec. 31, 1912, were therefore about 80,656,973 tons of 2.2% ore on 205.2 acres, or less than one-half of company's proven mineralized belt, about 10% of its total acreage. This tonnage ensures a life of about 82 years on basis of present production.

Equipment at the Ray shaft includes a 250-h. p. steam plant with a double-drum hoist and a 10-drill air compressor, and there are 4 hoists at the other shafts, with an additional air compressor, but the mine is to be operated electrically throughout, taking current over a transmission line already built from Hayden to Ray. There is a crushing plant at the mine, reducing ores to about 1" size, before shipping to the mill.

The company owns and operates its own railway, known as the Ray & Gila Valley, from Ray to Kelvin, the trains continuing over the tracks of the Arizona railway (S. P. R. R.) to Hayden Junction and thence over a branch line, belonging to the Ray & Gila Valley to the Hayden concentrator. The line between Ray and Kelvin is standard gauge and is operated as a common carrier. It has 80-lb. rails, Mogul locomotives and 60-ton steel ore cars. The company has a very favorable freight contract with the Phoenix & Eastern for the transportation of ores partially over that line.

The old concentrator at Kelvin, 6 miles from the mine, inherited from the English owners, was enlarged 1907, to 300 tons daily capacity and extensive experiments were made until Aug., 1909, these resulting in the concentration of ores 17 into 1, with a 70% recovery of assay values.

The concentration plant occupies a 4,000-acre site at Hayden, about 16 miles from the mine. In its essential features it is a duplicate of the Garfield mill of the Utah Copper Co.

The mill, of 8,000 tons daily capacity, has eight 1,000-ton sections, and is so designed that it may be enlarged, on the unit plan. The crushing department has 16 sets of 42x10" rolls, and 24 six-foot Garfield Chilean mills. Sizing is done by 48 impact screens, and concentration is effected by Garfield roughing tables, 72 Wilfley tables, Woodbury tables, Frue vanners and horizontal-motion suspended vanners. Water, derived from the Gila river and the adjoining hills, is sent to a 4,000,000-gal. reservoir at the mill site through 30" pipes, by pumps having a capacity of 7,000 gals. per minute.

The mill handled 1,125,082 tons of ore in the first 6 months of 1913, or an average of 6,460 tons per day with a concentration of 16.13 tons into 1. Ore treated averaged 1.7035% copper and the recovery was 66.915% for 35,937 dry tons of 18.647% concentrate for April, May and June, 1913, yielding 13,402,394 lbs. copper for the quarter. The mill started in March, 1911, treating an average of 850 tons of ore daily. The concentrates carry 18.94% copper and are well adapted to smelting, as regards sulphur and iron contents, only a small amount of limestone being required for fluxing. Con-

centrates are treated in the Hayden smelter, built and owned by the American Smelting & Refining Co., in 1912.

The power plant at the mill site, of 10,000-h. p. capacity, supplies electric current for the operation of the entire property. The plant has water-tube boilers, burning oil and running four 2,500-h. p. Allis-Chalmers triple-expansion engines, direct-connected to four 1,750-kw. electric generators.

Costs at present are as follows: Mining, 73.92 cts. per ton; milling, 45.25 cts. per ton; development charged up at 12½ cts. per ton. Actual costs of refined copper marketed 9.5 cts. per lb.

Production is now (Sept. 1, 1913) at the rate of 6,460 tons of ore per day, or a monthly production averaging 4,467,465 lbs. of copper for the second quarter of the year. Production was 15,721,520 lbs. copper in 1911 and 25,851,496 lbs. in 1912. For the first 9 months in 1913 production was 38,741,207 lbs. copper compared with 25,370,835 in 1912 for the same period.

The completion of the last unit of the concentrator in September enables the mill to handle its full capacity of 8,000 tons a day, which it is expected will be crowded to 10,000 tons per day, when everything is adjusted. This additional capacity and the better grade of ore that will be mined when the edges of the orebody now being mined are cleaned up, and the main portion of the orebody is worked, should greatly increase the annual production of copper. With the mine and works running at full capacity on the average grade of ore, the management expects an annual production of at least 80,000,000 lbs. fine copper yearly, but it is probable that the mine and works will not be running at their normal capacity until nearly, or quite, the end of 1914. The management expects to lay down finished copper, on the seaboard, at a cost under 9 cts. per lb., and the company's engineers estimate that a net profit of at least \$1.75 per ton of ore can be secured. The tonnage already developed places the Ray Consolidated among the very greatest copper mines of the world, with a certainty that the present enormous ore tonnage will be largely increased, and a possibility that it may be doubled. The management is practically the same as that of the Utah Copper Co., the pioneer among the so-called porphyry mines of the world, and is thoroughly experienced, strong and capable.

RAY EASTERN COPPER CO.

ARIZONA

Office: 202 Endicott Bldg., St. Paul, Minn. Mine at Mineral Creek, Gila Co., Ariz. Charles Danielson, pres.; Reiner Hoch, vice-pres.; O. Erickson, treas.; Charles Hogeboom, sec.; preceding officers, F. J. Voss, A. C. Osborn and Hon. F. B. Seager, directors. DeLestry Engineering Co., St. Paul, Minn., and Globe, Ariz., managing engrs. Organized Dec., 1909, capitalization \$5,000,000, shares \$1 par; issued, \$1,000,000; bonded for \$75,000, issued \$10,000. Guarantee Securities Co., St. Paul, Minn., transfer agent.

Property, 12 claims, on Mineral creek, about 5 miles east of the Ray Consolidated, said to show several veins carrying chalcopryite, bornite and covellite averaging 2% copper. Ore occurs in a crush zone paralleling the foliation of Pinal schist which at this locality is traversed by diabase dikes and shows quartzite reefs.

Development by 2 shafts, 175' and 100' respectively. No. 1 shaft has 2 levels, at 85' and 175'. Drilling is contemplated to prove existence of orebodies.

Equipment includes steam hoist, pump, saw mill, smithy and several office buildings.

RAYMOND-ILLINOIS MINING CO.

UTAH

Office: 506 Atlas Blk., Salt Lake City, Utah. Mine office: Eureka, Juab Co., Utah. J. C. Sullivan, pres. and gen. mgr.; J. M. Wheeler, vice-

pres.; J. C. Lynch, sec.-treas.; preceding officers, Hon. Thos. Kearns and Frank J. Hagenbarth, directors, at last accounts. Organized 1905, under laws of Utah, capitalization \$150,000, shares \$1 par, assessable. Assessments of one-half-cent a share fall due Oct. 11 and Nov. 28, 1913, and Jan. 15, 1914. Property is in the Tintic district and shows fissures and replacements in limestone. Developed by about 1 mile of tunnels and a 1,500' vertical shaft, which as yet have shown but little ore. The bottom workings are wet. Diamond drilling was done, 1909-10, from the bottom of the shaft.

REALITO MINING CO.**MEXICO**

Mine near Tapalpa, Jalisco, Mex. Shut down at last accounts. Lands, 25 pertenencias, near Chiquilistlán, 30 miles N. W. of Sayula, include the Cupriferá, Rinconada and Sin Nombre groups. Ore occurs in blanket veins, and in fissures, giving assays up to 60% copper, 2 kgs. silver and \$10 gold per ton.

REBEKAH MINING CO.**WASHINGTON**

The company owns 5 claims near Nespelem, Okanogan Co., Wash., with a vein carrying ore said to show chalcocite with copper, gold and silver values averaging about \$28 per ton. This vein is reported to be traceable for 3,000'. Development consists of 150' shaft with drifting and crosscutting. No recent returns secured.

RECORD MINES CO.**ARIZONA**

Address: Mudersbach mine, Bouse, Yuma Co., Ariz. Owns Mudersbach mine with 23 claims, 8 miles south of Bouse, on the main road to Quartzite, in the foothills of the Palomas mountains. The property covers the strike of a contact metamorphic zone showing gossans of specular hematite, underlain by oxidized ores to shallow depth, succeeded by auriferous and argentiferous copper sulphides, an average sampling, Sept., 1910, giving 4.5% copper.

Ore occurs as bornite, chalcopyrite, pyrite and hematite in a garnet-epidote gangue; it is an irregular bunchy replacement, a few inches to a few feet thick, of limestone resting on schist, and altered by quartz monzonite.

The mine, which is one of the oldest locations in the district, was taken over, 1910, from the Excelsior Gold & Copper Mining Co., for a price reported to have been \$250,000. The main orebody has been opened at several points by a number of pits and shafts, of 10 to 50' depth, showing ore, and a shaft, No. 1, 190' deep. The first level is at 100'. A carload of 10.4% ore was shipped, Aug., 1910, to the Clara smelter.

Equipment includes two 15-h. p. gasoline hoists, a gas engine and air compressor. The mine was developing, with a small force, at last accounts.

RED BIRD CONSOLIDATED MINING & SMELTING CO. ARIZONA

Address: Wenden, Yuma Co., Ariz. Geo. C. Wentworth, supt.; M. M. Briggs, sec. Claims carry copper and gold-silver ore developed by a shaft and a tunnel. Was being worked by leasers at last accounts.

RED CANYON MINING CO.**NEVADA**

Idle. Mine office: Gardnerville, Douglas Co., Nev. H. P. Chesley, pres.; B. F. MacKay, vice-pres.; A. F. Doyle, sec. and mgr.; C. L. Doyle, treas.; preceding officers, L. C. Hunter, W. L. Thompson and P. C. Wilder, directors; H. C. Jessen, supt., at last accounts. Organized Feb., 1907, under laws of Arizona, capitalization \$1,000,000, shares \$1 par.

Lands, 5 claims, 100 acres, in Yerington district, but mine office is in the adjoining county. Property is said to show 3 veins, with northeasterly and southwesterly strike, traceable 7,500'. The main vein is said to be 30 to 100' wide, with dip of 30 to 45°, showing cuprite, malachite, bornite and chalcopyrite, assaying 2 to 6% copper, with some lead. Company claims to

have exposed 13,000 tons of ore averaging 8% copper and \$1.30 per ton in combined gold and silver values. Development is by 6 shafts, of 30 to 75', and 6 tunnels, of 50 to 350'.

RED CLIFF EXTENSION MINING CO.

BRITISH COLUMBIA

Office: Vancouver, B. C. Mine office: Stewart, Skeena division, Cassiar district, B. C. F. B. Lewis, pres.; A. P. Maxwell, sec.; A. B. McFee, supt. Organized 1910, under laws of British Columbia. Lands, 4 claims, adjoining the Red Cliff Mining Co., and apparently carry the extension of the Red Cliff vein.

RED CLIFF MINING CO.

BRITISH COLUMBIA

Closed down. Office: Vancouver, B. C. Mine at Stewart, Skeena district, B. C. A. Erskine Smith, pres.; A. D. Tennant, vice-pres.; F. Wilcox, sec.; A. C. Ray, H. L. Lowndes, F. T. Chadwick and William Savage, directors. Organized June, 1909, capitalization \$1,500,000, shares \$1 par; issued, 1,291,200.

Lands on the Portland canal, said to be owned outright, show a main orebody claimed to be about 100' wide, carrying ore averaging 3 to 18% copper, 1 to 4 oz. silver and \$16 to \$24 gold per ton. Mine is developed by a 400' shaft with 1,240' of drifting and crosscutting on the 400' level and 800' on the 300' level. Superintendent reports the ore shoots aggregate 250' long and average 20' in width. Shipments to the smelter of 1,249 tons in 1912 averaged but \$14.50 gross value with freight and treatment costs of \$8.76, leaving but a narrow margin for profit after mining costs were deducted.

The company had a promising prospect on which \$308,654 has been expended. According to the present statement, all but 60,000 shares were sold at par or better. Office expenses for 1912 were \$12,252; assuming similar sums for 2 previous years and adding that to mine development, leaves a balance of \$885,889 unaccounted for. Did it go into the pockets of the promoters, or the vendors? The shares were boosted on optimistic statements up to \$2.05, or a valuation of \$3,000,000, a ridiculous figure for an undeveloped prospect. The people that invested in the company have lost their money and one investor, brooding over his loss, has gone to the insane asylum.

Mine is shut down, treasury empty, property mortgaged for \$70,000, and a report by J. L. Parker states that there are 20,000 tons of ore available with a net profit of \$1 per ton, which means that property is not worth the mortgage.

RED CLOUD MINE.

NEW MEXICO

Mine address: Corona, Lincoln Co., N. M. J. H. McCutcheon, operator. Property includes the Red Cloud, Crazy Horse, Rain-In-Face, Deadwood, Camp Bird and Louis claims, in the Red Cloud district of the Gallinas mountains, in the N. W. corner of Lincoln county. The two first-named mines show copper and silver-lead ores, and shipments were being made, 1913.

RED CONE MINING CO.

ARIZONA

Succeeded the Four Metals Co. and was itself reorganized 1912, as Red Mountain Copper Mining Co.

RED COPPER QUEEN MINING & MILLING CO.

UTAH

Mine near Ibapah, Tooele Co., Utah, adjoining the Western Utah Copper Co.'s property. C. P. Snell, manager, at last accounts. Incorporated with capitalization \$50,000, increased, 1909, to \$100,000, shares \$10 par. The mine has a short tunnel cutting a 16' vein, said to give average assays of 36% lead, 42 oz. silver and \$8.60 gold per ton. Was developing, with a force of 6 men at last accounts.

RED CROSS MINING CO.**WASHINGTON**

Idle. Mine near Index Snohomish Co., Wash. David Boyle, pres.; D. F. Scanlan, treas.; R. W. Emerson, sec. Organized 1906, under laws of Washington, capitalization \$1,000,000. Lands, 15 claims, on Bald mountain, Snohomish county, near the claims of the Bunker Hill Mining & Smelting Co., said to show 4 veins, 3 of 7' to 8' average width, and 1, in granite, of about 8' average width, opened by a 65' tunnel.

RED LEDGE MINE.**IDAHO**

Situated 10 miles north of Landore, Adams Co., Idaho, in Deep Creek canyon, 2 miles from Snake river. Claims cover a very large outcrop of quartz porphyry, about 1 mile long and 2,000' wide, which is permeated with a fine-grained cupriferous pyrite as well as stained with green carbonate of copper. Claims also show values in gold and silver at the surface. Development to date has consisted only of 2 tunnels, 95' and 150' long respectively, which have proven the existence of secondary enrichment and a second zone of leaching. The property appears to be a disseminated copper deposit which warrants development.

RED METAL MINING CO.**MONTANA**

Dissolved April 20, 1913. Assets, 500,000 shares of Anaconda Copper Mining Co. stock, transferred to parent company, the Butte Coalition Mining Co.

RED METALS CO.**NEVADA**

Mine office: 16 Washoe Bank Bldg., Reno, Washoe Co., Nev. A. W. Holmes, pres.; Geo. T. Milner, sec. and gen. mgr.; Jas. Howell, treas. Organized May 12, 1910, under laws of Nevada, capitalization \$1,000,000, shares \$1 par, nonassessable, in \$50,000 preferred and \$950,000 common stock; issued, \$1,500 preferred and \$786,200 common stock. Annual meeting, first Monday in June.

Lands, 16 claims, unpatented, 300 acres, on Peavine Mountain, Washoe Co. The property carries lenticular deposits, between diabase and diorite, 2 of which, under development, are 1 to 12' wide and show copper carbonate and bornite ore, said to average 9% copper, 15 oz. silver and \$4.80 gold per ton. Development by main working tunnel, 1,200' long, besides 2 prospect tunnels of 130' and 180' and 86' shaft, showing ores said to assay up to 60% copper and \$177 gold per ton. The 600' of drifts and stopes are estimated by the management to show 11,000 tons of ore. The mine was opened 1866, for silver, closed 1877, owing to the low price of that metal, and again reopened, 1908.

Improvements include several mine buildings. Shipments of 15 to 19% copper ore have been made intermittently for several years. In Oct., 1913, company is reported to have opened a vein of bornite ore 6" to 6' thick.

RED METALS MINE.**IDAHO**

In Big Creek district, Idaho Co., Idaho, on Profile creek, a tributary of the South Fork river. Claims are 2 miles south of Profile gap and show a body of silicious smelting ore along the wall of a 600' quartz deposit. The orebody contains gray copper, samples running 1,500 to 2,000 oz. in silver. There is a paystreak 2 to 6" wide of silver-gold ore and the property is evidently more valuable for its precious metals than for copper.

RED MOUNTAIN COPPER GROUP.**BRITISH COLUMBIA**

Property has been bonded for \$75,000 and is now operated by the Consolidated Mining & Smelting Co. of Canada. Property consists of the Red Mountain, Imperial and Majestic claims, situated on the east side of Howe sound, 26 miles from Vancouver and 4,000 to 6,000' above sea level. Ore has a silicious gangue carrying chalcopyrite, magnetite and pyrrhotite in a shear zone near an igneous contact. The developed ore shoot is 132' long, 75'

wide and shows 4.75% copper, 11 oz. silver, 50% silica, 14.5% iron, 16.16% sulphur and traces of lime.

RED MOUNTAIN COPPER MINING CO.

ARIZONA

Mine address: Mowry, Santa Cruz Co., Ariz. Oscar A. Turner, manager. Owns the Four Metals mine in which a large orebody has been cut in 2 tunnels, one 300' above the other. The upper tunnel 1,000' long cuts through 700' of concentrating ore. The lower tunnel 1,200' long is the main haulage and working level. Property reported to be working 50 men, all but 9 of them in ore. Shipments are made to Patagonia, 12 miles distant. A 1½-mile pipe line and new wagon road were built 1913.

Company plans erecting power plant and concentrator at Guajalote flats, near the mine and developing energetically through the winter of 1913-14.

Company is a reorganization of the Red Cone Mining Co., which itself succeeded the Four Metals Mining Co.

RED MOUNTAIN DEVELOPMENT CO.

ARIZONA

Office: P. O. Box 3007, Lowell, Ariz. Mine office: Dragoon, Cochise Co., Ariz. Frank Briggs, pres., treas. and gen. mgr.; Wm. Hawley, vice-pres.; E. J. Briggs, sec. Organized Oct. 5, 1908, under laws of Arizona, capitalization \$1,000,000, shares \$1 par, nonassessable. Annual meeting, second Tuesday in September.

Property, 17 claims, 340 acres, crossed by the main line of the Southern Pacific railway, show schist, porphyry and limestone. Claims have a vein claimed to be 130' wide and traceable 2 miles, carrying copper and lead ores, including copper oxides and chalcopryite, said by management to average 12% copper, 8 oz. silver and \$1 gold per ton. Development consists of a 100' shaft. Idle owing to lack of funds, but hoped to resume work in 1914.

RED MOUNTAIN RAILROAD, MG. & SM. CO.

COLORADO

Office: 1004 West End Trust Bldg., Philadelphia, Pa. Mine office: Red Mountain, Ouray Co., Colo. Geo. Crawford, gen. mgr.; David Forster, supt., at last accounts. Organized Oct. 6, 1902, under laws of Arizona, capitalization \$5,750,000 preferred stock. Lands, 54 claims, including the Yankee Girl, Genesee and Vanderbilt mines, carrying auriferous and argentiferous copper ores. Developed by tunnel, with about 3 miles of workings, the principal working being a long drainage tunnel which cuts through the mountain and has developed ore in "breaks" or fissures, known as No. 4 and No. 7½. Equipment includes steam and electric power.

A stockholders' investigating committee appointed July, 1911, submitted a printed report Jan. 25, 1912, covering the entire history of the company and its operations. This report states that in May, 1911, the receiver was authorized by the court to issue \$60,000 worth of 8% receiver certificates, constituting a first lien on all properties of the company and that about \$75,000 was needed to pay off these receivers' certificates and various small bills, besides nearly \$250,000 owing to 17 other creditors.

Company is reported to have spent nearly \$1,000,000 for the purchase and development of the property, including \$112,278 with \$65,000 preferred stock, for the construction of the Silverton railway, now the only asset of income value. In this report a reorganization was advised.

RED POINT & RACE HORSE GROUPS.

BRITISH COLUMBIA

Situated 22 miles from Alice Arm on Kitsault river, Portland Canal district. Said to show chalcopryite ore averaging from \$2.50 to \$11 per ton on the Red Point claim and up to \$53 in gold, silver and copper on the Race Horse. It is reported that these claims have been bonded for \$100,000 by T. F. Hopkins, of Seattle, Wash.

RED RAVEN MINING CO.**BRITISH COLUMBIA**

Idle in 1912. Mine address: Jedway, Queen Charlotte island, B. C. Property, on Moresby island of the Queen Charlotte group, near the Awaya-Ikeda mine.

RED ROVER COPPER MINING CO.**ARIZONA**

Office and miner: Phoenix, Maricopa Co., Ariz. Dr. R. N. Craig, pres.; J. Apfield, vice-pres.; R. M. de Gex, treas. and gen. mgr. Organized July, 1909, under laws of Arizona, capitalization \$1,000,000, shares \$1 par. Lands, 12 claims, known as the Red Rover Group, 15 miles north of Camp creek and 50 miles north of Phoenix, the nearest rail point. The mine has a 200' tunnel and a 370' incline shaft, with about 1 mile of workings, showing a 10 to 16' orebody between limestone and porphyry, carrying a 3' paystreak estimated to average 10% copper, 6 to 60 oz. silver and \$20 gold per ton. The Red Rover mine, discovered 1882, has shipped from shallow workings about \$200,000 worth of high-grade ore, running about 15 to 25% copper, with values mainly in silver chlorides, 1 carload of 20 tons netting \$41,000, with no allowance made for copper contents. The vein on the Reliance-Montana claims is 4 to 15' wide with an average of 7'. Production for 1912 was 300 tons of ore averaging 10% copper and 90 oz. silver and yielding nearly \$40,000. A carload shipped Aug., 1913, is said to have sampled 57.6% copper and 1,421 oz. silver.

RED WARRIOR MINING CO.**UTAH**

Office: Providence Bldg., Duluth, Minn. Mine office: Milford, Beaver Co., Utah. Leonidas Merritt, pres.; Jas. T. Hale, vice-pres.; W. H. Borgen, sec.; E. R. Ribenack, treas.; preceding officers, W. A. Kaake, John E. Merritt, Angus Buchanan and W. F. Acker, directors; Wilbur J. Merritt, supt. Organized Jan. 25, 1908, under laws of Minnesota, capitalization \$250,000, increased Jan., 1911, from \$150,000, shares \$1 par, nonassessable; issued, 210,000. Shares are listed on the Duluth Stock Exchange and New York curb. Annual meeting, second Tuesday in January.

Company owns a silver-lead mine comprising 8 claims, 1 patented, 95 acres, in the Star district, 8 miles from the S. P. L. A. & St. L. R. R. The claims show orebodies occurring along the bedding planes of limestone, the one under development having an average thickness of 6', an average width of 50' and proven depth of 600', and carries ore estimated by the management to average 21% lead, 1% zinc, 18 oz. silver and 25 cts. gold per ton. In the deeper levels the mine has shown ore assaying 12% copper, 1% lead and 3 oz. silver per ton.

Development consists of an 812' vertical shaft with levels at 500' and 675' and a 200' winze sunk on the vein from the 500' level. There are also numerous old shallow shafts and tunnels, the mine having about 3,000' of old and 4,000' of new workings. These workings were estimated to show 20,000 tons of ore, with about 10,000 tons blocked out for stoping by the former management. The mine was operated from 1870 until 1889 and was reopened 1907, by this company. The shaft is being deepened to 1,000'.

Equipment includes a new hoist good for 1,500', a 25-h. p. gasoline hoist and a 3-drill Fairbanks-Morse air compressor. Production was about 1,000 tons of silver-lead ore 1910, said to have given average returns of about 0.75% copper, 28% lead and 14 oz. silver per ton. It is understood that the mine has the same N.-S. ore channels mined in the Moscow mine, whose workings of equal depth are about 1,500' distant. The company employs only 15 men, but is opening up the orebody on the 600' level, finding ore in the fissure as well as the bedding plane on that level, reported to be 3' wide and to average 70% lead, 20 oz. silver and \$1.60 gold per ton. Property a promising venture, but not yet a mine.

RED WING MINE.**ALASKA**

Mine address: Ketchikan, Prince William Sound district, Alaska. Capt. and Mrs. E. E. Wyman, owners and managers. The mine, which is on Hetta inlet, Prince of Wales island, was under development, but no shipments made, 1912.

REDEMPTION COPPER MINING & MILLING CO.**ARIZONA**

Office: Kingman, Ariz. Mine office: Chloride, Mohave Co., Ariz. O. D. M. Gaddis, pres.; C. M. Stowe, vice-pres.; J. E. Perry, sec.; C. E. Dotterer, treas. Owns, or did own, the Clyde mine, with shafts of 104' and 114', and tunnels of 125' and 195', a total of about 1,000' of workings, developing a vein of 2' average width, having a paystreak carrying about 3% copper, 25 oz. silver and \$2 gold per ton, with oxidized ores near surface. Equipment includes gasoline power, and there is a 25-ton concentrator, putting about 5 into 1. The first carload of concentrates was shipped to the Humboldt smelter in 1910. No recent returns secured.

REDMAN MINING, MILLING & SMELTING CO.**ARIZONA**

Bankrupt. W. T. Wintemute, secretary-treasurer, was arrested for fraudulent use of the mails, and suit was brought against the company by John Derry, the superintendent. Property reported, 1912, to have been taken over by the Redman Stockholders Corporation. Formerly at McCabe, Yavapai county, Ariz.

REDOUBTABLE GOLD & COPPER M. & M. CO.**COLORADO**

Office: Salida, Colo. Mine near Turret, Chaffee Co., Colo. David Heaton, pres.; W. W. Roller, vice-pres.; J. W. Calhoun, treas.; J. H. Hunt, sec., and Geo. Sullivan, directors. Organized 1907, under laws of Colorado, capitalization \$1,000,000.

Property, formerly held by Par Value Gold & Copper Mining Co., included a 3-year bond and lease on the Gold Bug and Mandate claims. Lands show 4 fissure veins of about 3' average width, carrying oxidized and sulphide ores, former said to average 5% copper, 3 oz. silver and \$10 gold per ton, opened by shafts of 200' and 400', with about 3,000' of workings. No recent returns secured.

REDWOOD COPPER MINING CO.**WASHINGTON**

Secretary and office: W. E. Albee, 608 Phoenix Bldg., Minneapolis, Minn. Mine at Chewelah, Stevens Co., Wash. Organized under laws of Arizona, capitalization \$50,000. F. W. Philbrick, William Corpron, A. C. Burmeister, W. H. Sulflow, C. G. Bullis, G. G. Hysor, and T. F. James, directors.

Development includes a 400' tunnel with several hundred feet of raises and winzes which are expected to expose copper at greater depth. Operations ceased in April, 1912, but are to be resumed, 1914.

REDWOOD COPPER QUEEN MINING CO.**CALIFORNIA**

Idle. Mine is 35 miles S. E. of Ukiah, Mendocino Co., Cal. W. P. Ferguson, pres.; Thos. Mellersh, sec.-treas., at last reports. Lands, 840 acres, patented, developed by tunnels and winzes. Vein, much broken by faults prominent on surface, has a 2 to 4' gossan capping, traceable for a mile. Country rocks are brecciated porphyry and sandstone. Ores include cuprite, melaconite, malachite, azurite, chalcopyrite and tetrahedrite. No recent returns secured.

REFORMA MINING & MILLING CO.**MEXICO**

Mine address: Campo Morado, Guerrero, Mex. José M. Ortiz, chairman; Vicente Ortiz, gen. mgr. Lands, the Reforma mine with 1,000 hectares, showing 2 parallel ore zones, one of which is said to range up to 40 meters width. The lode carries lead ore with 750 to 5,000 grams silver and up to 50 grams gold per metric ton, succeeded, at depth, by a large

body of cupriferous pyrite, said to assay 3 to 8% copper, with fair silver values. Mine is developed by 14 tunnels, with about 6 miles of workings, has electric haulage, and a considerable amount of ore developed.

Transportation, to the nearest railway, at Rio Balsas, is by means of 1,800 mules, but a 20-mile aerial tram has been planned. The reduction plant includes a mill and a smelter, with two 25-ton lead stacks.

Property was under option, 1910, for 20,000,000 pesos, to the Exploration Co., Ltd., of London. The property is capable, if given better transportation facilities and a smelter, of becoming a large copper producer.

The mine is a big one with numerous orebodies, and large reserves of low-grade ore, which, however, require an expensive plant and an extension of the railway from the Balsas bridge to Campo Morado, to be profitable. Company has been a notable producer of gold, silver and copper, but the rich ore is now mostly extracted.

REGAL MINES CO.

ALASKA

Office: 2 Rector St., New York. Mine office: Kennecott, Alaska. Walter M. Briggs, pres.; H. I. Gaskill, sec.-treas.; James Phillips, Jr., C. Hartman Kuhn, Chas. S. Farnum, Mulford Martin, E. F. Gray, directors. E. F. Gray, gen. mgr. Organized 1912, under laws of Maine, capitalization \$250,000, shares \$5 par, fully paid and nonassessable; issued, 25,013. Annual meeting, first Tuesday in November. Company is a subsidiary of the Great Northern Development Co.

Property, near Kennecott, Copper River district, is developed by shaft, 115' deep at last accounts, sunk on a contact between limestone and greenstone and showing copper glance ore. See parent company.

REGUA-SAVAGE GOLD & SILVER M. & M. CO.

COLORADO

K. Macdermid, manager, Cripple Creek, Colo. Is a subsidiary of the United Gold Mines Co., and owns an extensive acreage in the Cripple Creek district, Colo., including the Blue Bird mine, carrying ore shoots of rich gray copper ore, now being mined by the Blue Bird Gold Mining & Milling Co., operated 1913.

REID-NEWFOUNDLAND CO.

NEWFOUNDLAND

Address: St. Johns, N. F. Owns a copper property at New Bay, N. F., which is now idle. Property was under development in 1907, but has never been a producer.

REINA DE COBRE; MINA.

MEXICO

Alamos, Sonora, Mex. Alfredo R. Cano y Ca., owners; Juan G. Cano, mgr. Property includes the Reina del Cobre and Porfirio Diaz mines, developed by shaft and tunnel, carrying auriferous and argentiferous copper ores. Mines employed about 50 men, when operated. Probably closed down owing to revolution.

REINDEER COPPER & GOLD M. & M. CO., LTD.

IDAHO

Office: 510 Bank St., Wallace, Idaho. Mine office: Mullan, Shoshone Co., Idaho. W. H. Herrick, pres. and mgr.; Lyman Wood, vice-pres.; I. R. Adams, sec.; F. C. Norbeck, treas., and Jas. A. Wayne, directors; Ernest G. Gnaedinger, engr. Capitalization \$100,000, shares 10 cts. par, assessable. In Oct., 1913, this company was consolidated with the Copper Queen Mining & Milling Co., Ltd., to form the Reindeer Queen Mining Co., and the property turned over to the new company. See Vol. X for particulars about old company.

REINDEER QUEEN MINING CO.

IDAHO

Office: Wallace, Idaho. Mine address: Mullan, Shoshone Co., Idaho. A. B. Crawford, pres. and mgr., Mullan; J. C. Glahe, vice-pres., Burke; J. H. Wixon, treas., Wallace; W. B. Heidfelt, sec., Wallace; preceding officers,

A. R. McRae, Mullan, P. P. Weber, Wardner, and S. D. Le Mieux of Blackbear, directors.

Organized Sept. 19, 1913, under laws of Idaho, capitalization \$200,000, shares 10 cts. par, assessable. Company is a consolidation of the Copper Queen and the Reindeer Queen companies, whose holdings are contiguous and cover extensive copper exposures. The new company assumes all obligations of the old corporation and exchanges stock, share for share. The consolidation makes possible the speedy development of the orebody already cut by the Reindeer tunnel which can now be extended as a drift along the vein into the ground heretofore owned by the Copper Queen.

Property consists of 15 claims in the Mullan copper belt, including the Stevens Peak (or Copper Queen) group and the Reindeer group of 6 claims, all at the head of Willow creek. The outcropping shows a big copper-stained fissure vein, 5 to 20' wide.

Development consists of a 3,000' crosscut tunnel which has cut the vein at a depth of 800', showing bornite and chalcopyrite ore opened by a drift on the vein. This can now be extended and will open up stoping ground. There are also several other openings, including a 500' tunnel on the Queen group.

REINS COPPER CO.

MONTANA

Formerly at Butte, Mont. Property sold by sheriff, 1911, to J. P. Reins for about \$25,000 and later redeemed by John F. Willard, a judgment holder, for \$130,000. Now held by the Anaconda Copper Mining Co. See Vol. X for description of property.

RELIANCE GOLD MINING CO.

NEW MEXICO

Probably dead. Letter unclaimed at Albuquerque, Bernalillo Co., N. M. Arthur S. Percy, pres.; Walter Haynes, sec.-treas.; preceding officers, J. E. Baker, Harry Owens, A. H. Drummond and Geo. F. Ropes, directors; W. S. Baker, fiscal agent, at last accounts. Capitalization \$250,000, shares \$1 par. The company claimed, 1910, to be paying monthly dividends, at the rate of 8% yearly, on the 25th day of each month. Lands are said to be 9 claims, 20 miles from Albuquerque, in the heart of the richest mineral zone of the continent, which is interesting if true. The company viewed with suspicion.

RELIANCE MINE.

MONTANA

D. M. Adams, owner, Divide, Mont. Property in the Moose Creek section, Silver Bow county, 17 miles south of Butte, shows a vein of copper-silver-lead ore, opened by a 95' shaft, on which work was in progress, Sept., 1913.

RENO YERINGTON COPPER CO.

NEVADA

E. L. Brown, sec., 944 West 6th St., Reno, Nev.; A. A. Marsal, supt. Mine at Yerington, Lyon Co., Nev. Property, north of the Bluestone mine, has an ore zone developed by 700' tunnel and an incline shaft sunk on the contact which has not yet reached the 200' level. Equipment includes hoist and buildings. Property was bonded, 1913, to Geo. Wingfield, who is operating the adjoining claims of the Montana Yerington Copper Co., but the bond was relinquished and property reverted to original company.

REORGANIZED BLUE BULL MINING CO.

NEVADA

Office: P. O. Box 565, Goldfield, Nev. Geo. Wingfield, pres.; F. A. Favier, vice-pres. and asst. sec.; A. H. Howe, sec.-treas.; preceding officers, J. S. Henderson and K. M. Simpson, directors. Organized 1912, under laws of Nevada, capitalization \$1,500,000, shares \$1 par. J. S. Cook & Co., Goldfield, Nev., registrar. Annual meeting, third Monday in December. Company was organized to acquire title to the property of the Blue Bull Mining Co., sold at sheriff's sale June 14, 1912. Latter company's stock was exchanged share for share for new stock on payment of 1 ct. per share.

Property consists of 8 claims, 148 acres, in the Goldfield district, Esmeralda county, Nev. Development is by a 730' shaft with workings on the 500 and 700' levels opening up the Victor and Blue Bull veins. The vein on the 500' level carries 14" of copper ore with gold-silver values, averaging \$30 per ton.

REPUBLIC MINES CO.

NEW MEXICO

Office: 526 Exchange Bldg., Denver, Colo. Mine office: Lucero, Mora Co., N. M. Felix J. Woodward, pres.; Walter Littlefield, vice-pres.; Marcus Finch, sec.-treas. and gen. mgr. Organized Dec. 8, 1903, under laws of Colorado, capitalization \$500,000, increased, 1909, to \$1,000,000, shares \$1 par.

Lands comprise about 7,500 acres, patented, half freehold and half under bond and lease. Claims are 30 miles from a railroad, stretching for 8 miles along Coyote creek, from Mora river to the adjacent mountains, showing a series of 3 parallel cupriferous beds of slate and arenaceous shale, alternating with limestone, having an approximately N.-S. strike. The lands are said to include coal, limestone and iron ore deposits.

The property has upwards of 120 openings, mainly shallow pits, with a 50' shaft and several tunnels, longest 650', and is said to have about 4,000' of workings. There are 3 main beds, of 3 to 8' claimed average thickness, with 3 minor beds, said to show considerable chalcocite, claimed to give average assays of 8 to 17% copper, with an estimated average tenor of 6%. The company's "expert," Prof. Tyler, is said to have estimated the value of its orebodies, to depth of 350', at \$45,000,000. Though the surface showings are said to be attractive, the geological character of the deposit does not warrant a belief that the property will ever support such a statement. Company has equipment for a smelter on the ground, ready to install, according to Mr. Finch, the secretary.

REPUBLIC MINING CO.

ARIZONA

Mine office: Johnson, Cochise Co., Ariz. Lands, 9 claims, include the old Republican mine, having a 350' shaft; the Republic Extension mine, with shafts of 50', 75' and 150', and the Mammoth mine, having incline shafts of 150' and 400'. Property shows auriferous and argentiferous sulphides up to 15% in copper tenor. The Republican mine was working in the summer of 1912, and it was reported that a large body of high-grade ore had been cut, but no confirmation of this report has been received.

REPUBLIC SMELTING CO.

COLORADO

Letter unclaimed at Leadville, Lake Co., Colo. Capitalization \$500,000. Owns the remodeled 500-ton smelter, with 3 furnaces, formerly owned by the Boston Gold-Copper Co.

REPUBLIC SMELTING CORPORATION.

CALIFORNIA

Idle. Office: Parker, Ariz. Mine in Riverside mountains, southern California. F. C. Fenner, pres.; R. G. Munn, sec. Capitalization \$7,500,000, shares \$10 par.

Property consists of various claims, mill sites and placer land in the East Riverside mountains, 8 miles from Calzona, Bendigo district, Cal. Claims said to show veins in limestone, cut by dikes and to carry copper-gold ores. The company had options on the Calzona, Jack Knife, Silver Dollar, Ox Bow, Gold Dollar and Jack Knife Extension mines, but failed to make the payments due. None of these properties have extensive development, but the surface indications are good and the shafts down to 100' and 150' give favorable results.

Secretary writes Sept., 1913, that company is "out of business," but independent reports indicate that corporation is still intact and owns a group of claims along the same contact zone as the Corem, Steece and Calzona properties. The former vice-president of the company, using the

name of John Chestnut, sold 40,000 shares of stock in a preceding corporation and is said to have kept the money and fled the country. This action effectually stopped all plans for financing the company, although it had been reported on by several able engineers and metallurgists.

RESTAURADORA DE BACA ORTIZ; COMPANIA. MEXICO

Mine office: Tepehuanes, Santiago Papasquiaro, Durango, Mex. Property is La Candelaria mine, carrying gold and silver bearing copper ore, developed by shaft. Equipment includes steam power.

REVANCHA; MINA LA. MEXICO

Mine at Ojocaliente, Zacatecas, Mex. J. Incarnacion Spina, owner, and R. Spina, mgr., at last accounts. Has silver-lead and copper ores, with a Chilean mill and steam power. No returns secured.

REVENUE MINING CO. NEW MEXICO

Home office: Chicago, W. A. Franklin, manager, Jicarilla, Lincoln Co., N. M. Property, a group of claims in the Juggler hills, near Ancho peak, Jicarilla mountains, shows veins of silver-copper ore. Development includes a 185' shaft with 200' of drifting, all on low-grade ore. The Sallie Dear group, 4 claims, located 1912, by the company's manager, shows a 12' vein of \$12 to \$15 ore, equipped with a new 25-ton mill and cyanide plant, completed Aug., 1913.

The Colorado-Denver group, owned by Col. W. J. Murphy, of El Paso, adjoins the Revenue. The nearest railway point is Ancho on the E. P. & S. W. R. R.

REVIAS CREEK MINING & POWER CO. MONTANA

Office: care Dr. N. Solvail, Union Bank & Trust Bldg., Helena, Mont. Mine at Camp Revias, near Dixon, Sanders Co., Mont. John B. Brown, gen. mgr. and purch. agt.; Clarence Rae, supt. and mg. engr.; W. Rae, mine supt.; Thos. Buggy, assayer. Organized May 15, 1910, capitalization \$3,000, shares \$500 par, fully paid and issued. Annual meeting, second of January.

Property, 6 claims, 2 fractions, unpatented, 5 acres, situated 6 miles from N. P. R. R., in Revias Creek district, adjoining the Dixon mine on the S. W.; also 150 acres timber land. Ore occurs in veins in altered granite and as contact veins between granite and altered quartzite, with strike of 45° and average dip of 43°.

Development, by a 500' tunnel and 3 prospect tunnels, with 95' of cross-cutting, said to expose mostly oxides down to 200' where ore changes to sulphides of copper. The 4 orebodies under development are said to show a 4' vein, traceable 6,000' and proven to 300' depth, carrying 11% copper, 8 oz. silver and \$6 gold per ton. Management estimates about 2,000 tons ore blocked out. The course and distance of the main fissure vein is reported to have been proven by the adjoining claims of the Spokane Development Co., lately taken over by the Revias Co. and the Dixon property, the latter being a regular shipper of ore netting \$28.50 per ton during the last 3 years.

REVIAS MINING CO. MONTANA

Address: care Gabe La Boeuf, owner, Dixon, Sanders Co., Mont. Chas. A. Allen, sec. Lands, on the Flathead reservation, well timbered, adjoin the Dixon mine, a regular shipper. The outcrop shows high-grade auriferous and argentiferous copper ore, developed by tunnel.

REWARD CONSOLIDATED MINE. CALIFORNIA

Office: Independence, Inyo Co., Cal. Property shows complex copper-lead ores with gold and silver values, developed by tunnels. Company has developed an orebody, mined to supply a 10-stamp mill with 50-ton cyanide plant. Mine and mill together employed 30 to 40 men at last report.

REX GOLD MINES & INVESTMENT CO. COLORADO

Mine office: Leadville, Lake Co., Colo. S. P. McDonald, sec.; Jesse F.

McDonald, mgr., at last accounts. Lands include the Rattler and Reconstruction mines, carrying lead and copper ores, opened by tunnel, and equipped with steam power. Property was being worked by lessees, 1911.

REXALL SILVER & COPPER MINING CO.

UTAH

Office: 333 Atlas Bldg., Salt Lake City, Utah. Mine near Alta, Salt Lake Co., Utah. Milton E. Price, pres.; John Gallacher, vice-pres.; Samuel S. Porter, sec.-treas.; preceding officers, A. Swenson and W. R. Butler, directors; Gust Malmborg, supt. Organized 1907, under laws of Utah, capitalization \$125,000, shares 25 cts. par, assessable, 1 ct. per year, with 6 assessments levied; issued, \$74,250. Annual meeting, first Monday in June.

Lands, 6 claims, patented, about 90 acres, adjoining the Cardiff mine, on the South fork of Big Cottonwood canyon, 17 miles from a railway. Development is by several pits and shafts, No. 1, a 65' incline, showing a 2' vein of carbonate ore, carrying up to 52 oz. silver per ton. No. 2 shaft, 250' deep, also shows silver ore, and a 700' tunnel shows silver-lead and copper ore. Mine has about 450' of crosscuts and drifts. Shipped several tons ore, 1912.

REY DEL ORO MINING CO.

MEXICO

Idle. Mine address: Mulatos, Sonora, Mex. Formerly controlled, through ownership of entire stock issue, by Greene Gold-Silver Co., now bankrupt. Lands, 6,400 acres of mineral property, with miscellaneous holdings, a total area of 24,700 acres. Wood and water are scarce. Owns the Mulatos mine, the principal property, and La Blanca and La Colorado mines. The Mulatos shows immense dikes, up to 500' in width, carrying gold on the cleavage faces of a fractured silicious material, which forms veins and veinlets in the dikes. Copper carbonates occur sparingly, in streaks, in the dikes, and there also are several narrow copper veins of some promise. The ore averages about 1 oz. silver and \$3 gold per ton, and is readily amenable to cyaniding. Production, claimed to have been upwards of \$18,000,000, has been made mainly from rich ores, extracted from and near surface by leasers, and treated in arrastres.

Equipment includes an old 60-ton mill, having 6 Bryan mills and a 25-ton cyanide plant. Closed down several years and property has probably reverted to former owners. No returns securable, owing to revolution.

REYMERT MINE.

ARIZONA

Jas. F. Tighe, superintendent, Superior, Pinal Co., Ariz. Is an old silver mine, 10 miles from Superior, that has been idle for 10 years but reopened 1913, by Gunn-Thompson interests. Shows strong vein 60' wide with shoots of silver-copper-lead ore in Tertiary intrusives. Recent development is by a new 170' shaft, being sunk in Sept., 1913, at rate of 100' a month. Equipment includes 20-h. p. gasoline hoist.

REYNOLDS-ALASKA DEVELOPMENT CO.

ALASKA

Office: 42 Broadway, New York. Mine office: Latouche, Latouche island, Alaska. Marvin F. Butler, pres.; Walter C. Gilbert, vice-pres.; J. Frank Birdsall, sec.-treas.; preceding officers, A. E. Austin, Hon. J. G. Brady, J. S. Conabeer, H. M. Coffin, John Yule, O. C. McGilvara and Edmund Smith, directors; G. M. Richards, supt.; A. F. Hancock, foreman. Organized 1903, under laws of Washington, capitalization \$3,000,000, shares \$1 par, in \$1,000,000 cumulative 6% preferred stock and \$2,000,000 common stock. Authorized March 3, 1908, a \$500,000 twenty-year 6% gold bond issue; issued, \$125,000. Annual meeting, first Tuesday in April.

Lands are 102 claims, about 3,000 acres, in Valdez district, Prince William sound, Alaska. Company was in receiver's hands until June, 1910, when discharged by court order. Company reported, 1913, to have sold its properties to the Galena Bay Mining Co. (which see). Former mismanagement fully described Vol. X.

The Boulder Bay group of 31 claims, 620 acres, is on the Kenai peninsula. Claims show a contact deposit between greenstone and slate, carrying chalcopyrite, assaying up to 11% copper and \$3 gold per ton, but averaging 2 to 4% copper, developed by 2 tunnels. Equipment includes a 60-h. p. boiler and a 5-drill Rand air compressor. The Copper Mountain group of 9 claims is on Landlock bay, near Boulder bay.

The Iron Mountain group of 62 claims includes the Duchess and Blue Fox properties, on Horseshoe bay, about 60 miles west of Boulder bay, La-touche island. The Blue Fox mine has a 4' vein of ore, formerly claimed to average 7% copper, slightly developed by a shaft, now filled with water.

The Duchess mine, last worked, is developed by 2 tunnels, the upper a 375' drift tunnel, and the lower having 105' of drifts on the orebody, which has an average width of 16'. This group shows massive sulphide ore, estimated by the management to average about 5% copper.

Equipment includes a 200-h. p. hydro-electric installation, with a flume and steel pipe leading from Big Falls creek to a Pelton wheel, direct-connected to two 40-kw. generators. There is a 50-h. p. hoist and 2 Rand air compressors, of 5 drills aggregate capacity, with 6 air drills and 10 Ingersoll-Temple electric drills.

RHODE ISLAND COPPER CO.

MICHIGAN

Office: 60 Congress St., Boston. Mine office: Demmon, Houghton Co., Mich. R. M. Edwards, pres.; Henry Tolman, treas.; Albert L. Wyman, sec.; Chas. G. Rice, Sidney J. Jennings, Irving J. Sturgis and Harry M. Howard, directors. Organized 1898, under laws of Michigan, capitalization \$2,500,000, shares \$25 par; paid in, \$10.50. Assessment No. 2, of \$1, was payable Jan. 14, 1907, and assessment No. 3, of 50 cts., was payable June 15, 1910. Is controlled, through ownership of 99,030 shares, by the Franklin Mining Co. Annual meeting, second Wednesday in April.

Annual report for 1912 shows receipts from copper sold \$42,928; borrowed from Franklin Mining Co., \$43,096; rents and cash on hand, \$2,925; total receipts, \$88,949, compared with \$41,452 in 1911. Expenses amounted to \$79,412 at mine, \$5,147 taxes, balance being interest and incidentals.

Company owns 800 acres immediately north of the Franklin Junior mine. The ground has been explored by extensive diamond-drill work showing cores from the Mesnard epidote, Allouez conglomerate, Pewabic amygdaloid, Kearsarge amygdaloid, and other copper-bearing beds. All the formations lying between the Kearsarge amygdaloid and the Calumet conglomerate were drilled by a series of holes, the Calumet bed showing traces of copper. The first cores from the Kearsarge bed showed copper in somewhat encouraging quantities from a bed of about 19' width.

No. 1 shaft is 500' deep and sunk on the Pewabic amygdaloid. This lode is 8 to 10' thick, of which 2 to 3' near the hanging wall is well mineralized but spotty in the 4 levels opened. This shaft, abandoned 1902, is filled with water to the first level, on which it connects with No. 2.

No. 2 shaft, 1,227' deep, sunk a quarter of a mile north of No. 1, has 10 levels with a 125' winze, below the 10th. Most of the workings are north of the shaft, but there are drifts southward on the 8th, 9th and 10th levels, the latter 2,400' long. The 8th level south develops a fair stretch of copper ground toward the Franklin Junior, and a 1,400' drift on the 8th level north showed 25 to 75' stretches of payable ground. The Pewabic bed of the Rhode Island property is being developed by north drifts from No. 1 Pewabic shaft of the Franklin Mining Co., at a depth of about 2,000', where the bed averages 8 to 10' width.

In addition to exploration by diamond drilling, considerable underground work has been done to prove up various parallel copper-bearing

beds. The Albany & Boston, or Allouez conglomerate, has been opened by crosscuts on the 500' and 1,000' levels, but the showing secured was discouraging. A crosscut of about 250' length on the 10th level, about 1,100' south of No. 2 shaft, has disclosed an amygdaloidal bed of some promise. The east crosscut on the 8th level, at depth of 1,000', cut 2 apparently valueless beds, one being the Mesnard epidote. The East lode, about 5' wide, carries a little copper, but nothing of promise. The West lode, 96' from the Pewabic, is 7 to 9' wide, carrying occasional bunchy copper. The 4 amygdaloidal beds lying between the West lode and the Allouez conglomerate have been tested by N.-S. drifts, 3 proving barren.

No. 3 shaft is 1,800' north of No. 2, but work was discontinued at slight depth.

Equipment includes a frame shaft house at No. 2, with an engine house having a Nordberg hoist capable of raising 2-ton skips from a quarter mile depth, and a 12-drill Rand air compressor. Buildings include a 30x60' machine shop and smithy, a 30x50' frame warehouse and 15 dwellings.

The Rhode Island is idle and the plan of developing at greater depth through the north drifts of the Franklin is correct, as the Pewabic bed to the south of the Rhode Island has shown great improvement below a depth of 2,000' in both the Mesnard shaft of the Quincy and the main shaft of the Franklin.

RHODE ISLAND MINING CO., LTD.

IDAHO

Address: E. E. Clark, sec., Coeur d'Alene Hardware Co., Wallace, Idaho. A. G. Webb, pres.; Chas. Bolinger, vice-pres.; preceding officers, T. B. Lonergan and F. J. Martin, directors. Capitalization \$50,000, shares 5 cts. par. Assessment of one-half mill per share was levied Nov., 1911. Lands, 5 claims, 1 fractional, about 2 miles N. E. of Osborn, show a contact deposit of 15 to 25' surface width, between a quartzite foot and slate hanging. Development is by a shaft of about 100' and 2 crosscut tunnels, 1 of about 400' showing silver-lead ore, carrying gold-copper ore at slight depth, latter giving assays up to 8% copper and \$10 gold per ton. No recent returns secured. Probably idle.

RICHARD III MINING CO.

BRITISH COLUMBIA

Mine at Mt. Sicker, Vancouver island, B. C. C. H. Dickie, pres. and gen. mgr.; E. W. Molander, F. A. Wood, F. Haycroft, Geo. M. Perdue and Vernon Creed, directors; E. G. Miller, sec. Organized Feb. 24, 1904, under laws of British Columbia, as successor of Richard III Development Co., Ltd., capitalization \$650,000, shares \$1 par. Paid a 2½% dividend, 1907.

Property, 49 acres, lies next to the Tyee mine and carries the continuation of the ore zone of that property. The mine had a lenticular deposit of pyritic copper ore in basic schists, now worked out. Development consists of a 589' two-compartment shaft sunk in barren ground, with crosscuts to ore zone and 2,181' of work on 5 levels. Shipments of 3,200 tons, June, 1907, averaged about 4.5% copper, 3 oz. silver and 0.135 oz. gold per ton. Property practically idle. No returns secured.

RICHARDS-CLIFTON MINING CO.

UTAH

Idle. Office: Salt Lake City, Utah. Mine office: Ibapah, Tooele Co., Utah. Richard W. Young, vice-pres.; Harold E. Young, sec.-treas. Organized Sept., 1909, under laws of Utah, capitalization \$50,000, shares \$1 par. Lands, in the Clifton district, apparently have little development.

RICHFIELD COPPER CO.

MEXICO

Office: 812 Mears Bldg., Scranton, Pa. Mine office: Querobabi, Sonora, Mex. Dr. J. K. Bentley, pres.; Maj. J. A. Cooper, vice-pres. and gen. mgr.; Dalbys L. Fickes, sec.; Otto Robinson, treas.; preceding officers, Harry Witter, R. H. Gay, Geo. Stark, John Hershberger and Jacob Huffer, direc-

tors. Organized 1908, under laws of Arizona, as successor of Richfield Mining Co., capitalization \$5,000,000, shares \$1 par; issued, 4,000,000. Bonds, \$250,000 authorized, at 6%; issued, \$230,000. Scranton Trust Co., registrar. Annual meeting, second Saturday in October.

Lands, 1,300 acres of mineral property, with timber and ranch lands, giving total holdings of 26,512 acres in the Ures district. The Dos Naciones group, 12 miles east of Tuape and 35 miles from a railway, is said to have 7 contact deposits between granite and limestone, of 10 to 60' estimated average width. Development includes about 10,000' of underground work, showing oxidized ores and chalcopyrite, reported by present management to average 4 to 15% copper, 7 to 40 oz. silver and \$2 to \$5 gold per ton. A body of good ore is reported at a depth of 350'.

Equipment includes two 25-h. p. hoists and a 5-drill air compressor. There are several mine buildings and an 80-ton water-jacket smelter.

Shipments to the American Smelting & Refining Co. and Phelps, Dodge & Co. ran 9 to 10% copper, 10 to 32 oz. silver and \$2 to \$5 gold per ton. Management has been prevented from operating during the last years owing to revolutionary disturbances in Mexico, but plans beginning work in the near future.

RICHMOND & ANACONDA CONSOLIDATED MINING CO. UTAH

Property passed to Uncle Sam Consolidated Mining Co., 1912. At Knightsville, Juab Co., Utah.

RICHMOND CONS. MINES CO., LTD.

BRITISH COLUMBIA

Office: 318 Hastings St., Vancouver, B. C. J. L. Warner, mgr., Rossland, B. C.; S. Coulter, supt. Property, the Richmond group, showing veins with gold-silver-copper-lead ores. Development by 200' shaft. Equipment includes electric power and air compressor.

RICHMOND MINING, MILLING & REDUCTION CO.

MONTANA

Address: C. J. Heidenreich, mgr., Saltese, Missoula Co., Mont. C. J. Heidenreich, pres.; Dr. E. Richter, vice-pres.; S. Silberman, sec. Property, 6 claims, 3 miles S. E. of Saltese, adjoining the Monitor mine, opened by a 270' shaft, on a vein parallel to the Monitor, showing frequent occurrences of native copper and gold-copper ores of good average assay values. The property was a small producer for some years and was reopened, Sept., 1913, after many years of idleness, and 30% copper ore shipped. Equipment includes a gasoline hoist and compressor, installed 1913.

RICO ARGENTINE MINING CO.

COLORADO

Office: 222 Judge Bldg., Salt Lake City. Mine address: Rico, Dolores Co., Colo. C. D. Ray, pres.; C. B. Smith, vice-pres.; S. A. Greenwood, sec-treas.; preceding officers, G. A. Black, J. Woodmansey, Chas. Read, S. A. King and L. O. Hoffman, directors; C. D. Ray, mgr.; C. B. Smith, supt. Organized, 1911; capitalization \$100,000; shares 10 cts. par, assessable; \$95,000 issued. Company acts as its own transfer agent and registrar.

Property, the Black Hawk and Argentine groups, 21 claims, 145 acres, part patented, in the Pioneer district. Claims show limestone and sandstone cut by N. W.-S. E. flat-dipping fissures. There are 10 orebodies so far discovered that average 7' thick, 100' wide and are of undetermined length. The ore is a complex mixture of sulphides reported to average 5% copper, 15% lead and 25% zinc with 8 oz. in silver and 40 cts. gold per ton.

Development amounts to 5,000' of work in tunnels, numbered 1 to 4, of 750', 800', 250' and 1,000', respectively, with drift and crosscut work, reported to open up 50,000 tons of ore.

The old vertical veins and mushroom-shaped orebody at the top are worked out and company is now mining low-grade copper ores found in a number of beds, one above the other, on the N. E. side of the Black Hawk

fault. Ore is a contact metamorphic deposit containing chalcopyrite with other metallic sulphides in a gangue of garnet, wollastonite and epidote formed from massive limestone by monzonite porphyry. The origin of the ore is probably responsible for its erratic distribution. Ore also occurs along the Black Hawk fault and is similar in character. It is said that the company has opened up 8 orebodies within the last year, 1 of them 27' thick, averaging 5% copper.

Equipment includes 3,000' aerial tramway, hoisting plant, 2 blowers, ore bins and buildings. Property is a mile from R. G. S. R. and was shipping 5 cars a week in Jan., 1913, to Garfield smelter, freight and treatment charges being \$6 per ton.

RICO MINING CO.

COLORADO

Office: 24 Broad St., New York. Mine office: Rico, Dolores Co., Colo. Carl M. Owen, pres.; Wm. R. Sainsbury, sec.; Martin Schwerin, cons. engr. A. C. Massey, supt.; Geo. E. Hicks, power plant supt. Organized Oct. 25, 1911, under laws of Colorado, capitalization \$3,500,000; outstanding, \$260,000 preferred, \$1,750,000 common stock and \$480,000 first mortgage bonds; shares \$10 par. Company owns properties of the Pro Patria Mining & Milling Co. and the United Rico Mines Co., both dead.

Property, 156 claims, 1,110 acres with 20 acres mill site and 320 acres coal land, in the Pioneer district of Colorado. Ore occurs in fissure veins as replacements of lime. Claims are reported to show many veins averaging from a few inches to 15' in width, 1 mile long and proven to a depth of 700'. Ores in 1 mine carry 4% copper, 10% lead, 10% zinc and 10 oz. silver, according to superintendent, the copper ore occurring as chalcopyrite associated with pyrite, sphalerite and galena in fluoritic gangue.

Mine is developed by tunnels, 1,000 to 3,000' long and equipped with 125 hydro-electric power at mine and 100-h. p. at mill. There are two 75-h. p. hoists, 2 compound air compressors, 10 air drills and 1 air electric drill; two 9x15 Blake crushers, 18 Wilfley tables, etc.

Production for 1913 estimated by management at 1,200,000 lbs. fine copper; 1,000 tons treated during 1912 averaged about 4% copper.

On May 28, 1913, the company's stockholders approved a 10-year lease and bond on the property to Ray & Greenwood, of Salt Lake City. The lease provides a royalty of 10% on net smelter returns, a division of all royalties from sublessees in excess of 20%, and 50% of profit exceeding \$200,000, or 75% of any profit above \$1,000,000. The lessees have an option to buy the entire property for \$1,000,000 and may take mill and power plant for an annual rental of \$5,000.

The lessees are interested in both the Rico Wellington and the Rico Argentine companies and their option, if taken up, will pay up the first mortgage bonds and preferred stock and give a dividend on the common stock.

RICO WELLINGTON MINING CO.

COLORADO

Address: Jesse Knight, pres., Provo, Utah. C. J. Jensen, mgr.; Rico, Colo.; H. R. Trenholm, supt.; E. B. Hayes, mill supt. Organized in Utah, Aug., 1911, capitalization \$1,000,000, shares \$1 par; 51% of stock owned by Knight Investment Co. Annual report for 1912 shows total receipts of \$155,284, of which \$11,523 came from ore sales. Company owes the Knight Investment Co. \$78,769 and has a cash overdraft of \$6,626.

Property is the Wellington mine, which is developing and mining ore beds formed by replacement and contact metamorphism in the limestone beds of the middle member of the Hermosa formation. During the last 20 months, a large flat deposit of zinc-lead ore has been cut that is 400' long on the dip, 50' wide along the strike and 7 to 8' thick and lies parallel to

the Black Hawk fault. To the north the orebody is cut off by a cross fault that is parallel to the Nellie Bly fault, but the orebody has been recovered 170' below and north of the fault. Across the Black Hawk fault a large copper deposit, replacing limestone and broken by several faults, has also been opened, the ore carrying 11% copper, with good silver values.

Development for 1912 amounted to 3,822', and production for that year was 4,596 tons copper ore, valued at \$79,657; 463 tons lead ore, valued at \$11,477, and 1,068 tons of zinc ore, valued at \$20,389.

Equipment includes a 2,500' tram to the Rio Grande railroad, handling 50 tons per hour at a cost of 23 cts. per ton. The 100-ton mill, formerly belonging to the Pro Patria Co. and leased for 5 years, has been remodelled at a cost of nearly \$30,000. A tube mill, 5 Deister tables, 6 Callow tanks, 2 Callow screens and electrical equipment have been installed. Company shipped 17 cars of copper ore, 37 of lead and 10 of zinc in July, 1913. Property is a good one and, being managed by Jesse Knight, the company is assured of skilful, economical and up-to-date operation.

RIDGE COPPER CO.

MICHIGAN

Company liquidated and property sold to Mass Consolidated Mining Co., Ontonagon county, Mich.

RIO DOLORES COPPER CO.

UTAH

Office: 818 Marion St., Denver, Colo. Mine near Castleton, Grand Co., Utah. John Chase, pres. and gen. mgr.; Col. Thos. B. Crawford, sec.-treas., and Victor Elliott, directors; John Jackson, gen. mgr. Organized Feb. 8, 1906, under laws of Arizona, capitalization \$2,000,000, shares \$1 par, non-assessable; issued, \$1,750,000. Is controlled, through ownership of 350,000 shares, by Intermountain Industrial Mining Association, under the same general management. Annual meeting, first Thursday in July.

Lands, 20 claims, part patented, 400 acres, including 200 acres of mill sites at the head of Castle creek, 6 miles above Castleton, on Mineral mountain, in the La Sal district. Lands show granite, with porphyry intrusions, with several veins, 3 of them reported under development, and of 5' average width. The shoots yield a sulphide ore estimated to average 2 to 5% copper, 10 to 40 oz. silver and 0.5 oz. gold per ton.

Development is reported by the management to include 2,000' of workings, and is reported, independently, to include an 80' shaft. The management estimates 10,000 tons of ore blocked out for stoping. Equipment includes a 20-h. p. gasoline engine and a 2-drill Sullivan air compressor. There are 6 log buildings. Management planned installation of a concentrator, 1912.

RIO DOLORES MINING CO.

COLORADO

Mine office: Rico, Dolores Co., Colo. W. K. Cowan, treasurer, at last accounts. Lands, 2 miles north of Rico, are said to show a 3' vein, carrying ore assaying up to 8% copper. Company was said, Dec., 1910, to plan reorganization and resumption of work. In March, 1912, company was planning the erection of a concentrator.

RIO GRANDE & DOLORES SILVER MINING CO., LTD.

MEXICO

Office: 37 Old Jewry, London, E. C., Eng. Mine office: Mineral de Guadalupe, La Union, Guerrero, Mex. Walter J. Cutbill, chairman; Lieut.-Col. A. B. Haig, C. M. G., J. S. Middleton, and Brooke Mockett, directors; A. Kitching, sec.; Arthur M. Bourne, agt. Organized Dec. 11, 1877, under laws of Great Britain, capitalization £10,000, increased, Aug., 1881, to £17,000, shares £10 par, in £10,000 ordinary shares and £7,000 cumulative preference shares, fully issued and fully paid. After the payment of a 10% dividend on preference shares, remaining profits are divided equally. Debentures, £10,000, at 10%.

Property is La Nava mine, at Guadalupe, carrying copper ore, with values mainly in silver, developed by shaft and tunnel. Equipment includes steam and water power, with a 20-ton mill and leaching plant. Property employs about 100 men, normally.

RIO TINTO; COMPANIA MINERA.

MEXICO

Mine office: Guadalupe, Zacatecas, Mex. Property said to carry gold, silver and copper ores. Presumably idle.

RIO TINTO, S. A.; COMPANIA MINERA.

MEXICO

Mine office: Ario de Rosales, Ario, Michoacan, Mex. Organized Jan. 7, 1896, under laws of Mexico, capitalization 480,000 pesos. Property includes El Nuevo Boleo, El Olvido and Las Cardenas y Guayabo mines. No returns secured.

RIO TINTO COPPER CO.

MEXICO

Office: Perry Payne Bldg., Cleveland, Ohio. Mine and works office: Terrazas, Chihuahua, Mex. James Corrigan, gen. mgr.; H. A. Eye, supt.; Capt. M. D. Murray, mine supt.; H. L. Schneider, smelter supt.; J. M. Baker, smelter foreman; F. W. Topken, master mechanic. Organized under laws of Ohio, holding property through a subsidiary Mexican company, and is operated as a close corporation under the control of Corrigan, McKinney & Co. The Rio Tinto Mexicano mine and works were bought 1908, for a price said to have been \$187,500, and this company also took over the property formerly held by the San Rafael Copper Mining Co.

Mineral lands, about 25 miles north of Chihuahua City, comprise a main tract of 153 hectares, and a smaller tract of 6 hectares, including nearly all the developed mineral property of the Terrazas camp, except a few lead mines. The larger tract includes the Rio Tinto mine, and properties formerly worked by the Rio Tinto Mexicano Mining Co., Boston & Mexican Mining Co., Dragoon Mining Co. and San Rafael Copper Mining Co. The principal properties are the Rio Tinto Mexicano, San Rafael, Promontorio, Verde and Colombia mines, all connected underground. The company also owns the Savanarola group, at Savanarola, about 50 miles south of Chihuahua and 35 miles west of Ortiz, carrying silver-copper and lead ores.

The Rio Tinto Mexicano mine was opened 1860, closed 1902, and reopened 1905, and has been owned and operated by a number of different mining companies, ownership having been vested mainly, until purchased by the present company from Messrs. Enrique and Juan A. Creel. The mine shows contact deposits between limestone and altered andesite, there being 5 known orebodies in a metamorphic zone traced 1,500 meters, the orebody, with a minimum of 2', maximum of 100', and average of about 20' width, being erratic but of very large extent. Ore also occurs between the bedding planes of limestone, near a large quartz ledge, and the orebodies, while erratic in size and occurrence, are connected and practically continuous. The limestone has an average dip of 45° N.-W., and the property has also some silver-lead ore. Ore near surface is mainly oxidized, but sulphides occur below. The oxidized ores range 2 to 5% in copper tenor, with traces of lead and zinc, with an average of about 3% copper, 2 to 4 oz. silver and 30 to 75 cts. gold per ton. The gangue is mainly limestone, somewhat garnetiferous. Extensive diamond-drill borings show good orebodies.

The property is developed by a number of shafts, but only to a depth of 440', and has about 3 miles of workings. The ground is firm, breaking well and requiring no timbering, pillars having been removed to give chambers up to 100' square.

The San Rafael mine has 2 shafts, the deeper being a 440' two-compartment shaft, known as the Verde. The Promontorio mine has 2 new shafts, nearly 1,000' apart, the main Promontorio shaft being 350' deep, with

a surface gravity tram to ore bins. The Promontorio also has 2 old shafts. The Colombia mine has a 275' shaft, with about one-half mile of workings. Miscellaneous shafts include the Bronce of 120', Pedernal of 180', San Martin of 100' and Vinagre of 100'.

Equipment includes steam and gas power. The San Rafael main shaft has two 100-h. p. boilers and a 100-h. p. hoist, with 4-drill and 14-drill air compressors. There are 5 gasoline hoists of 6 to 22 h. p. at various other shafts.

Transportation between the mines and smelter is by a 1 mile narrow-gauge railway, taking ore from bins at the San Rafael, Promontorio and Colombia shafts, equipped with a 6-ton Porter locomotive and 5-ton iron ore cars.

The reduction works, at Terrazas, 1 mile from the mine, are connected by a one-half mile spur with the main line of the Mexican Central railroad. The smelter has two 300-ton 42x192" blast furnaces. The converter department has 1 stand and 3 shells, with a 40-ton electric travelling crane and a relining plant. The power plant has a 250-h. p. compound engine, direct-connected to a No. 8 Connorsville blower, and a 100-kw. generator supplies current for the other machinery.

The production, including output under former ownerships, was about 1,000,000 lbs. fine copper in 1906; 1,430,000 lbs. in 1907; 2,250,000 lbs. in 1908; 2,500,000 lbs. in 1909, and 2,000,000 lbs. in 1910. The 27,000 metric tons smelted by former owners yielded 2.5% copper, secured at a mining cost of \$3.50 per ton, and smelted at a cost of about \$3.50 per ton, giving an average cost for finished copper of about 12.5 cts. per lb. The ore is low grade, but exists in large quantities, and as the mine is in strong hands and has been given an adequate smelting equipment, it bids fair to become a considerable producer, and apparently is capable, with further mining developments, of making nearly or quite 1,000,000 lbs. fine copper monthly.

The mine and smelter have been able to operate more or less continuously throughout 1912 and 1913, despite the revolutions which have stopped almost all mining operations in this part of Mexico, but the coke supply ran low and the smelter closed down in Oct., 1913.

RIO TINTO-TREADWELL MINING CO.

WASHINGTON

Idle. Office: Spokane, Wash. Mine office: Curlew, Ferry Co., Wash. G. B. Dennis, pres.; J. L. Martin, vice-pres. and mgr. Lands, 7 claims, 4 miles S. W. of Curlew and 24 miles from Phoenix, B. C., said to show 4 parallel veins, with N.-S. strike, from 50 to 100' wide, carrying chalcopryite and galena, said to give assays of \$18.50 per ton in copper, lead, silver and gold values. The mine, developed mainly by assessment work, has several shallow shafts and a tunnel. No recent returns secured.

RIO TONTO MINING & MILLING CO.

ARIZONA

Idle. Mine near Morristown (Hot Springs junction), Maricopa Co., Ariz. Chas. J. Fisher, pres. and treas., at last report. Organized 1910, as successor of Rio Tonto Copper Co. Lands, 10 claims, 200 acres, south of and adjoining the White Cloud mine in the Pichaco Blanco mining district, 14 miles east of Morristown, and about the same distance from Wickenburg, on the Santa Fe railroad. Property is claimed to show gossans 200 to 300' wide, traceable up to 700' in length, carrying ores assaying 2 to 25% copper. Development is by a 46' two-compartment shaft, planned to be sunk 500'. Equipment includes a 12-drill air compressor.

RIO VERDE COPPER CO.

MEXICO

Idle. Mine at Baborigame, Chihuahua, Mex. Oliver Krull, mgr., at last accounts. Capitalization, \$2,000,000. Lands are the San Carlos group, 20 miles from Baborigame and 50 miles from Choix, on the western slope of

the Sierra Madre near Agiabampo (Port Stillwell). The mine has 2 shafts, 1 showing a 2' vein of mixed copper and lead sulphides, and the other a 2' vein of copper sulphides assaying 12 to 15% in tenor.

RIO YAQUI COPPER CO.

MEXICO

Mine near San Antonio de la Huerta, Sonora, Mex. M. Newman, pres.; Dr. C. Bledsoe, vice-pres.; L. A. Brown, second vice-pres.; Jesse Yoakum, sec.; C. N. Henkle, treas. Organized 1909. Lands, 1,185 acres, including the San Antonio Segundo group, showing evidence of old workings, adjacent to the San Antonio Copper Co. A dispute over the Arizona denouncement was settled, in the company's favor, Dec., 1909, but this property was sold to J. E. Curry, Sept., 1910. Apparently very little work has been done. Probably idle owing to revolutionary disturbances.

RIP VAN WINKLE CONS. GOLD M. & M. CO.

WYOMING

Idle. Office: Laramie, Wyo. Mine office: Morgan, Carbon Co., Wyo. Dr. I. R. Swigart, sec.-treas., at last accounts.

RIVER COPPER CO.

MEXICO

Idle. Office: 517 John St., Appleton, Wis. Mine office: San Antonio de la Huerta, Sonora, Mex. Capt. John R. Wood, gen. mgr.; Frank X. Pellier, supt. Property, in the vicinity of the San Antonio and under the same general management, is but slightly developed.

ROB ROY MINING CO.

IDAHO

Idle. Office: Wallace, Idaho. Hugh Toole, pres.; Otto A. Olsson, sec. Capitalization \$1,500,000, shares \$1 par. Lands, 5 claims, on Sunset peak, north of Burke, show a vein in porphyry carrying azurite, malachite and galena, with quartzite gangue, developed by a 180' tunnel. No recent returns secured.

ROB ROY MINING CO.

UTAH

Probably dormant. Letter unclaimed at Bingham Canyon, Salt Lake Co., Utah. Emanuel Rauch, pres.; Angus McKellar, Jr., vice-pres.; Edward McGurrin, sec.-treas. Capitalization \$75,000. Lands, 4 claims, on Clipper hill.

ROBERT EMMET COPPER CO.

MONTANA

Office: 30 Church St., New York, N. Y. Mine office: Amazon, Jefferson Co., Mont. Wm. Q. Ranft, pres. and gen. mgr.; Samuel Pratt, vice-pres.; John J. Schmitt, sec.-treas.; E. L. Freeman, asst. sec.-treas.; preceding officers, Jas. W. Cunningham, Isaac E. Ditmars, John E. McArthur, Thos. C. Marshall and Thos. H. Burke, directors; Robt. A. MacArthur, cons. engr.; J. W. Johns, supt. Capitalization \$3,000,000, shares \$5 par.

Lands, 6 claims, patented, 90 acres, carrying 3 veins in granite, not far from the andesite contact. The main vein has a generally N.-E. strike, developed by a 500' shaft, showing a shoot of copper ore of good grade on the 350' level. A 1,200' tunnel having about 1,000' of laterals shows a main vein up to 12' width, carrying copper, silver and lead ores, assaying up to 15% copper, 15% lead, 5 oz. silver and \$2 gold per ton.

Equipment includes 10-drill air compressor and a good electric plant, with a station having 3 General Electric transformers, stepping down a 60,000-volt current, taken from the United Missouri River Power Co., the Robert Emmet Co. also furnishing power to adjoining operators. Employed 30 men during 1912.

ROBERT LEE MINE.

NEW MEXICO

Address: Pyramid Camp, via Lordsburg, Grant Co., N. M. Owned by Dan. Breil and Harry Small, of Lordsburg, N. M. Mine was operated in 1885 and was later purchased by Dr. Bartlett, inventor of the Bartlett concentrating table, who erected a mill and milled \$97,000 worth of ore. The claims show a well-defined quartz-calcite vein running N. E.-S. W. and dip-

ping S. E., lying in a zone of altered and chloritized diorite porphyry. Development includes the old shaft, 250' deep, which has been reopened and shows in the lower level a streak of ore 2' thick, carrying 30% copper and 500 oz. silver. During summer of 1913, shipments of 2,500 tons averaged 3 to 7% copper and 10 to 30 oz. silver.

ROBERTA MINING & MILLING CO.

IDAHO

Idle. Mine near Gem, Shoshone Co., Idaho. Wm. Dyer, pres.; Jos. Lutey, Jr., vice-pres.; H. L. Tanner, sec.; W. C. Orton, treas.; Thos. Roberts, mgr.; preceding officers, Curtis Lewis and Alex. Penaluna, directors. Lands, 12 claims, patented, well timbered, on Nine Mile creek, carry 4 known veins. Development is by 3 short tunnels, lower of 150', planned to be driven 2,000' to give a back of 800' to cut 4 veins, 1 of which shows at surface lead and copper carbonates, giving assays up to 6% copper, 10% lead, 16 oz. silver and \$3 gold per ton. Company's holdings are in the lead belt, not the copper section of the Coeur d'Alenes.

ROBERTS-ALLEN-MAVIS GROUP.

ARIZONA

Address: Parker, Yuma Co., Ariz. Property shows a strong vein outcrop having a shoot of copper-gold ore said to carry a 5' ore streak in the 100' incline shaft, half of it \$50 smelting ore. Mine under development, 1913.

ROCHELLE MINING & MILLING CO.

CALIFORNIA

Mine office: Bishop, Inyo Co., Cal. A. C. Ringwald, president, at last accounts. Ores are said to include native copper, bornite, chalcopryrite and tetrahedrite. No returns secured.

ROCHER DE BOULE COPPER CO.

BRITISH COLUMBIA

Office: 419 D. F. Walker Bldg., Salt Lake City, Utah, care John F. Cowan, sec.-treas. and gen. mgr. Mine at Hazelton, B. C. M. S. Browning, pres.; A. Fred Wey, vice-pres., and S. A. Douglass, directors. J. A. Cowan, supt. Organized Oct. 15, 1911, in Arizona, capitalization \$1,000,000, shares \$1 par, nonassessable; fully issued, fully paid. Annual meeting, Oct. 20.

Property, 6½ claims, crown grant, 325 acres with 50 acres mill site and 100 acres other lands, in Hazelton district. Ore occurs in fissure veins in granite, veins having an E.-W. strike with dip of 60°. Five ore shoots being developed have average width of 5½', are 3,000' long and proven to depth of 150', according to management.

Development by a 40' shaft and 200' tunnel estimated to have blocked out 25,000 tons of ore averaging 15% copper, 5 oz. silver and \$1.50 gold per ton. Copper occurs principally as chalcopryrite and bornite.

Company plans installing power plant and driving a crosscut tunnel to tap vein, 500' deep. The company is reported to have \$10,000 in treasury, with no debts. Mine is being systematically developed with a force of 15 men. Mine is 9 miles from the Grand Trunk Pacific railroad.

ROCK ISLAND MINE.

MONTANA

Idle many years. Mine office: De Borgia, Missoula Co., Mont. Anton Lutz, mgr.; Jas. Presnell, resident mgr., at last accounts. Lands, 20 quartz claims and 160 acres of placer ground, 5 miles north of De Borgia, carry 3 veins, 1 opened to depth of 320', mainly by tunnel, with about 2,000' of workings. The workings on the main vein show mainly silver-lead ore, with a little copper followed at greater depth by a great decrease of silver-lead ore. Equipment includes a steam plant with two 60-h. p. boilers, a hoist good for 1,200', and a 6-drill air compressor.

ROCK SPRINGS EXPLORATION CO.

NEVADA

Address: William Ace, president, Rock Springs, Wyo. Property, a group of claims near Contact, Nev., shows low-grade contact metamorphic deposits of copper ore. Property idle most of 1913, but reported preparing to resume work in October.

ROCKY MOUNTAIN CONCENTRATING & MLG. CO. COLORADO

Mine office: Black Hawk, Gilpin Co., Colo. Edgar S. Moulton, manager, at last accounts. Ores carry gold, silver and copper. Has gasoline power, a 25-stamp mill and a 75-ton concentrator. No returns secured.

ROCKY MOUNTAIN MINES CO. NEW MEXICO

Office: care G. L. Brooks, pres.; Albuquerque, N. M. Mine at Cerrillos, Santa Fe Co., N. M. E. L. Goose, sec.; H. O. Brooks, treas.; B. A. Stotz, mg. engr. and gen. mgr. Organized 1913, to work property formerly owned by the Sunset Mining & Smelting Co.

Property, 3 claims, 240 acres, in the Cerrillos district, held under lease and bond. Claims show orebodies in zone of crushed monzonite and andesite, averaging 18" wide, 360' long and proven to a depth of 176'.

Development, by former companies, by 3 shafts, 76 to 140' deep and 3 drift tunnels, 120', 361' and 442' long, said to show ore carrying 0.30% copper, 7% lead, 20% zinc, 4 oz. silver and \$0.60 gold per ton. The Tom Payne claim is the only one now worked.

Equipment includes a 15-h. p. hoist, several buildings and concentrator with 1 Dodge crusher, 11x14", 1 Hardy and 5 Wilfley tables, 2 slime tables. Smelter, 6 miles from the mine, will not be operated by present company, management planning to make zinc-lead concentrates only during 1913.

ROGERS-ARIZONA MINING CO. ARIZONA

Office: Indianapolis, Ind. Mine address: Rogers Springs, via Cave Creek, Maricopa Co., Ariz. Dr. O. C. Lukenbill, pres.; H. H. Udell, supt. Capitalization \$100,000, shares \$1 par, nonassessable.

Property, 27 unpatented claims in Cave Creek district, 28 miles north of Phoenix, the nearest railway point. Elevation 2,000'. Claims are covered by granite and granite porphyry with a 40-acre tract of mineralized and silicified porphyry on the Dora B and May claims. On this portion of the property there is a shear zone in which the rock is copper stained and contains copper glance. Though the ore over the surface is of concentrating tenor, it is of no present commercial value as it is too remote from a railroad.

Development is slight, consisting of numerous shallow pits and a 110' shaft, now inaccessible. Churn drilling has been proposed to determine whether property contains a large enough deposit of disseminated ore to warrant building a railroad, as without it the property cannot be profitably worked.

ROGERS SPRINGS MINING & SMELTING CO. ARIZONA

Address: W. E. Marlar, rural delivery 4, Phoenix, Ariz. This company is the residuary legatee of several corporations formed by James Marlar to work the Red Top group west of Cave Creek settlement.

An old blast furnace, a stack that had been hauled around Arizona for 20 years or more, was purchased and put upon the Red Top claim, but afterward moved to its present location where there is water nearby. In 1912, this company bought 10 tons of ore from the Kay Copper Co., and smelted it to black copper, but have not paid for the ore at last accounts.

The claims show blocky schist with occasional slight staining.

ROHR-GEDDES MINING & DEVELOPMENT CO. NEW MEXICO

Office: Raton, N. M. Letter unclaimed at mine office, Clayton, Union Co., N. M. Fred Rohr, pres.; Robt. Vogl, vice-pres.; L. G. Gregory, treas.; Frank A. Wall, sec.; J. E. Geddes, gen. mgr., at last reports. Lands, 420 acres, a few miles west of the Pittsburgh Copper Co., in the Peacock Canyon district, have several pits and shafts of 15 to 40' depth, and a 267' shaft showing sulphide ore, said to assay 22% copper, with small gold and silver values. No returns secured.

ROMERO MINING CO.**NEW MEXICO**

Margarita Romero, owner, Las Vegas, N. M. Property, the Santa Nino claim at El Porvenir, San Miguel Co., N. M., has a deposit of copper-gold ore, developed by tunnel and shaft work. Equipment includes steam power and a 10-ton King mill and rolls for concentration work.

ROOSEVELT MINES & REDUCTION CO.**ARIZONA**

Address: Silver Hill, Pima Co., Ariz. Incorporated 1912, but died in early infancy.

ROOSEVELT MINING CO.**UTAH**

Organized 1913, capitalization \$100,000, shares 10 cts. par. Property, 9 claims, N. E. of the American Flag mine in Park City district, Summit county, Utah.

ROOT RIVER GOLD & COPPER SYNDICATE.**ONTARIO**

Idle. Office and mine: Sault Ste. Marie, Algoma, Ont. B. W. Harris, pres.; F. B. Sullivan, vice-pres.; Alex. McIntyre, second vice-pres.; T. Robinson, sec.; Wm. Calder, treas. Organized under laws of Ontario, capitalization \$1,000,000, shares \$1 par. Lands, 40 acres surface rights, and mineral rights to 640 acres, in Sec. 32, township of Aweres, 11 miles north of Sault Ste. Marie, on the Algoma Central railroad. Property has a vein of 12 to 16' width, traceable 1,000', carrying auriferous and slightly argentiferous copper ore, giving average assays of 2.37% copper, developed by a 70' shaft. Developed only in recent years.

ROSALIE COPPER CO.**ARIZONA**

Address: Haddock & Schackelford, 424 Dwight Bldg., Kansas City, Mo. Mine near Mayer, Yavapai Co., Ariz. Samuel L. Casey, pres.; Wm. Nellis, first vice-pres.; Marshall Haddock, second vice-pres.; W. N. Rynerson, treas.; E. M. Metcalf, sec.; Geo. C. Meese, gen. mgr.; preceding officers, Chas. Schifferdecker and Wm. A. Moses, directors. Organized under laws of Arizona, capitalization \$3,000,000, shares \$1 par.

Lands, 9 claims, patented, 180 acres, in the Copper Creek district, 25 miles S. E. of Mayer and 18 miles from Cordes siding, the nearest rail point, with a wagon road between. The mine has numerous pits and shafts, of 10 to 148' depth, and a 1,000' tunnel, developing a 2 to 7' vein carrying native copper, in the oxidized zone, followed by bornite, chalcopryrite and occasional chalcocite ores, said to assay 4.15 to 7.3% copper, with small gold and silver values. Equipment includes a 50-h. p. gasoline engine and air compressor. No recent returns. Not favorably regarded.

ROSARIO MINE.**ARIZONA**

Address: Superintendent, Rosario Mine, Benson, Cochise Co., Ariz. Property, on northern flank of Santa Rita mountains, has orebodies in limestone yielding smelting ore. Working and shipping in summer of 1913.

ROSARIO MINE.**MEXICO**

Situated in the Nacozari district, Sonora, Mex. Mine produces high-grade copper-silver ore, found in small bunches in fissure veins in igneous rock. Has been worked intermittently for several years past.

ROSE, JOHN.**ARIZONA**

Owens group of 9 claims north of and adjoining the Inspiration mine, Miami district, Gila Co., Ariz. Developed by 100' tunnel in diabase which cut 2½' vein showing shoot of copper silicate ore averaging 15% copper, in July, 1912.

ROSE SPRINGS MINING CO.**CALIFORNIA**

Office: 514 Pacific Bldg., San Francisco, Cal. Mines at Battle Mountain, Lander Co., Nev., and at Tuolumne, Tuolumne Co., Cal. James Healey, pres.; L. H. Trescott, vice-pres.; S. O. Trescott, sec.-treas. Capitalization \$2,500,000, shares \$1 par.

Property in California being developed by tunnel. Reported to have opened up a 4' vein of free-milling gold, which was cut by a fault soon after company had erected a mill to treat the ore. In searching for this vein a 7' vein of sulphide ore is said to have been exposed, which management plans to treat later.

ROSEMERE MINING CO.**ARIZONA**

Owned by Edward Pattee, H. S. Smith and A. H. Parkes. Mine address: Florence, Pinal Co., Ariz. Mine in the Sacaton mountains, 44 miles east of Phoenix, and 5 miles from Webster station on the Arizona Eastern railroad. Property is a small prospect that shows a little copper ore. Only shallow work as yet.

ROSEMONT COPPER CO.**ARIZONA**

Office: 11 Broadway, New York. Mine at Rosemont, Pima Co., Ariz. Is controlled by Adolph Lewisohn and Lewisohn Bros. The mine has numerous orebodies in limestone, occurring under geological conditions superficially similar to those at Bisbee. Considerable new development work was done in 1912. Company also owns claims at Helvetia and others adjoining the Tiptop mine, near Helvetia, but the bulk of its holdings are on the east side of the Santa Rita mountains, west of the Rosemont postoffice. Company has a small smelter, long idle. Property regarded as promising.

ROSS MINING & MILLING CO.**COLORADO**

Idle many years. Office: Ross Bldg., Waynesburg, Pa. Mines and works office: Silverton, San Juan Co., Colo. J. M. Mitchell, pres.; Frank L. Ross, sec.; H. T. Hamilton, treas.; J. B. Ross, mgr.; Patrick Lonergan, mine supt., at last accounts. Organized Dec. 13, 1904, under laws of Colorado, capitalization \$2,500,000, shares \$1 par, nonassessable. Had an indebtedness, July 31, 1909, of \$111,173, of which \$100,000 was in the form of 6% bonds. Pittsburgh Trust Co., registrar and transfer agent. Annual meeting, second Saturday in September.

Lands, 42 lode claims, 310 acres, and 50 acres of placer claims, mainly patented, with 3 mill sites, 80 acres, and miscellaneous lands giving total holdings of 760 acres, in the Animas, Eureka and Red Mountain districts. Apparently the lands formerly held under bond and lease from the San Juan Smelting & Refining Co. were taken over, 1909.

The Champion mine, opened 1885, has 3 fissure veins in granite, and is developed by tunnels with total workings of 2,550', showing ore claimed to give assays of 5.5% copper, 25 oz. silver and \$10 gold per ton, probably above the average value of the ore. Equipment of the Champion includes a 75-h. p. steam plant, 5-drill Rand air compressor and 7 mine buildings.

The Belle Creole mine shows 2 fissure veins in andesite, reported as 20' wide and 1,600' long, slightly developed by shafts of 15' and 35', and by tunnels of 75' and 150', carrying low-grade milling ore estimated to average 15% lead, 12% zinc, 15 oz. silver and \$4 gold per ton. This mine is practically without equipment.

The Galtie Boy property shows 3 fissure veins in andesite, of 6' claimed average width, said to be traceable 3,000', opened to a depth of 600' by a 50' shaft and tunnels of 350' and 2,500', with total workings of 2,900'. Ore is said to give average assays of 3% copper, 10% lead, 10 oz. silver and \$5 gold per ton.

The company has had much financial trouble, like its predecessors and collateral relatives in the chain of promotions.

ROSSLAND GROUP.**NEVADA**

Situated 20 miles east of Mason, Lyon Co., Nev. Ross Thompson, owner. Was shipping ore to the Thompson smelter, said to average 8% copper, in 1913.

ROSSLAND KOOTENAY MINING CO., LTD. BRITISH COLUMBIA

Idle since 1904. Office: Salisbury House, London, E. C., Eng. Mine office: Rossland, Trail district, B. C. C. Williamson Milne, chairman; Dr. G. Shack-Sommer and Ernest E. Surridge, directors; Bedford McNeill, cons. engr.; F. A. Labouchere, sec. Organized May 17, 1902, under laws of Great Britain, as a reconstruction of Rossland-Great Western Mines, Ltd., and Kootenay Mining Co., Ltd., capitalization £150,000, shares £1 par; issued, £148,607.

Lands, 171 acres, at Rossland, carrying auriferous and argentiferous copper ores, of low grade, and 113 acres placer at West Kootenay. The company also owns 4,347 shares of the Santa Eulalia Development Co., Ltd., owning the Nueva Chihuahua property, at Santa Eulalia, Chihuahua, Mex. Has given a lease on the Nickel Plate mine at Rossland on a royalty basis, 1912.

ROUGH RIDER MINING & MILLING CO.**MONTANA**

Mine address: De Borgia, Missoula Co., Mont. A. L. Thurston, pres.; A. E. Wayland, sec. Capitalization \$1,500,000, shares \$1 par. Lands, 4 claims, 6½ miles from a railroad, carry an orebody without defined walls, opened by a 60' shaft, showing ore with values in lead, copper, silver and gold. No returns secured.

ROY MINING & MILLING CO.**UTAH**

Mine in Clifton, or Gold Hill district, Tooele Co., Utah, 90 miles N. E. of Cherry Creek on the Nevada Northern railroad. Franklin N. Millett, pres.; John H. Stratton, vice-pres.; Don. C. Clayton, sec.-treas.; preceding officers, Paul A. Millett and Walter Cox, directors. Organized May, 1909, under laws of Utah, capitalization \$55,000, shares 5 cts. par.

Lands, 12 claims, unpatented, have a 4' contact deposit along a limestone porphyry contact. This is opened by a 25' shaft, showing copper ore giving assays of 1 to 17% copper and \$7 to \$60 gold per ton. No returns secured.

ROYAL BASIN MINING CO.**MONTANA**

Office: Makeever Bros., 170 Broadway, New York. Mine office: Maxville, Granite Co., Mont. R. D. McRae and John McRae, former owners, Phillipsburg, Mont. John D. Fields, manager, Capitalization \$2,000,000, shares \$1 par, fully paid and non-assessable.

Property, the North Star mine of 2 lode claims, 90 acres, in Wymans gulch, within the Missoula forest reserve and 3 miles east of the Drummond branch of the N. P. R. R. Also owns the Northern Bell mine, a silver property near Princeton. Claims show a fissure vein 15 to 40' wide, in 3 upper tunnels, 100' vertically apart. A new lower tunnel is being driven which cut the vein 800' in and at a depth of 700'. At this point the vein carries concentrating ore 12' wide with a paystreak of sulphide ore, assaying 7½% copper and 5 to 70 oz. silver per ton. The smelter returns for over 1,100 tons shipped showed 5.14% copper.

Mine is equipped with a leaching plant using sulphuric acid to get the copper into solution and depositing electrolytic copper as cathode plates in tanks, direct from the solution, by electrolytic current. This plant was designed and is operated by the manager, J. D. Fields, who has since designed and built a similar plant for Capt. A. B. Wolvin at the Butte-Duluth mine in Butte, Mont.

While we have no details of this plant, the process, while simple and doing all that is claimed for it in the production of electrolytic copper, is not a cheap one when acid and electric power have to be purchased. Property considered promising, but advertising matter of fiscal agents is not favorably regarded.

ROYAL BLUE MINE.**ARIZONA**

Fraser, Lewis & McDonald, leasors, Benson, Ariz. Mine in Tyndall district, in the north end of the Santa Rita mountains, Cochise county, has a vein of copper-silver ore developed by tunnels. A shoot of ore found in the winze of lower tunnel is said to average 4' thick and \$60 in value. This shoot is being stoped and regular shipments are made to Benson.

ROYAL CONSOLIDATED COPPER CO.**NEVADA**

Office: 1206 Fullerton Bldg., St. Louis, Mo. Mine office: Hawthorne, Esmeralda Co., Nev. L. L. Crisp, pres. and gen. mgr.; G. L. Werth, vice-pres.; R. E. Drake, sec.-treas.; B. H. Martens, supt.; preceding officers, Robt. W. Alt and Albert Lawson, directors. Organized April 27, 1907, under laws of Arizona, capitalization \$2,500,000, shares \$1 par, nonassessable; issued, \$1,434,477, Dec. 31, 1910. Bonds, \$300,000, authorized, at 7%; issued, \$2,300, Dec. 31, 1910. Annual meeting, first Monday in April.

There are 2 companies of this title, 1 an Arizona, the other a Nevada corporation, the Arizona company apparently holding stock in the Nevada operating company.

Lands, 10 claims, 1 fractional, 200 acres, 8 miles from Luning and 16 miles from Hawthorne and Mina. According to the company's former expert, the formation is "dyarite," porphyry and limestone, with large "burns" of iron gossan, the ore deposits consisting of copper, gold and silver, lying in a fissure "cutting" a contact of porphyry and lime, the orebody being claimed to be 250' wide. Company reported Dec. 31, 1910, having 2 known orebodies of 6' average width. The president, in his report of 1909, claimed that "all high-grade deposits in large quantities are always found where 2 or more veins intersect or cross." In Dec., 1910, the company reported having shafts of 86' and 35', with a number of prospect pits and tunnels of 485', 35', 85' and 125'. Apparently the property has no power equipment and no buildings.

The company's past literature contains some ridiculous and misleading statements. Three men were working, early 1911.

ROYAL COPPER MINING CO.**WASHINGTON**

L. J. Winslow, president. Mine address: Chewelah, Stevens Co., Wash. Seven claims said to show 3 parallel ledges having slate and granite contacts. Developed by 400' tunnel said to show values in copper, lead, silver and gold. Being operated in 1913, a contract for crosscutting being given to C. F. Weist. Property is a silver-lead mine with but small amounts of copper.

ROYAL COPPER MINING CO., LTD.**MONTANA**

Office: Wallace, Idaho. Mine office: Belknap, Sanders Co., Mont. John H. Nordquist, pres.; Claus E. Anderson, vice-pres.; Otto A. Olsson, sec.-treas.; preceding officers, O. A. Olin, and Chas. Solberg, directors; Chas. D. Johnson, supt. Stock is assessable.

Lands, 12 claims, patented, near Thompson Falls, show a vein of about 18' surface width, traced 1,500' on company land, carrying copper and lead carbonates and sulphides, said to average 6% copper and 18% lead, with small silver values. Development is by prospect tunnels of 50' and 600', and it is planned to drive a third tunnel 200' vertically below No. 1. The property is a prospect on which assessment work only has been done for 2 years past.

ROYAL GOLD & COPPER MINING CO.**UTAH**

Mine in Paradise district, Cache Co., Utah. Reported to be operating extensively, but no trace of the owners, managers or development is obtainable.

ROYAL MOUNTAIN MINING CO.**MONTANA**

Was absorbed by the Cactus Copper Co. which bought the Sunday mine, a gold property in Granite county, west of Phillipsburg, Mont., in 1913.

ROWLEY COPPER MINES CO.**ARIZONA**

Office: Baxter Springs, Kans. Mine address: Gila Bend, Maricopa Co., Ariz. T. H. Goodwin, pres.; Mrs. Dora Rowley, vice-pres.; J. T. McRuer, sec.; J. O. Goodwin, treas. Organized July, 1909, under laws of Arizona, capitalization \$10,000,000, shares \$1 par.

Lands, 6 claims, unpatented, 120 acres, about 28 miles north of Gila Bend, developed by an inclined shaft to 80' below water level; is reported to have disclosed 3 strong veins of copper-gold ore. Company shipping ore from drifts. Equipment includes 100-h. p. boiler, hoist, compressor, etc. Property was bought for \$20,000 cash and \$1,000,000 stock, in 1910. Company is heavily overcapitalized.

R. R. R. COPPER MINE.**ARIZONA**

Described under Three R Mines.

RUBENA MINING CO.**MEXICO**

Probably dead. Letters unclaimed at La Poza, Sonora, Mex. Chicago Title & Trust Co., formerly registrars, write that they have failed to locate company for last 3 years. Fully described, Vol. X.

RUBI; COMPANIA MINERA.**MEXICO**

Office: Centro Mercantil, 30 Piso 25, Mexico, D. F. Mine office: Matchuala, E. de San Luis Potosi, Mex. Julio Limantour, pres.; Manuel Lomeli, sec.; T. A. Verger, gen. mgr., at last accounts. Organized July 24, 1907, under laws of Mexico, capitalization 250,000 pesos, shares 50 pesos par; paid in, 2 pesos 50 centavos per share. Lands, 84 hectares, including the Rubi, Bonanza, Todos Santos and Anexas de Todos Santos groups, opened by two 75-meter shafts, with about 200 meters of workings, showing gold, silver, copper and lead ores. Equipment includes gasoline hoists. A railway runs to the shafts, and ore is shipped to the Aguascalientes smelter, 6 kilometers distant. No returns secured and property probably closed down owing to revolution.

RUBY COPPER CO.**ARIZONA**

Office: 303 Midland Bldg., Kansas City, Mo. Mine office: Patagonia, Santa Cruz Co., Ariz. H. A. Sutermeister, pres.; F. D. Reasor, vice-pres.; C. E. Sweet, sec.; Chas. L. Cookson, treas.; preceding officers, A. E. White, R. W. Pierce, Harry J. Richards, F. P. Greenwood, and Dr. Emil Thielman, directors; C. A. Pierce, gen. mgr. and supt. Organized 1912, under laws of Arizona, capitalization \$2,000,000, shares \$1 par; issued, 528,388 shares. Debentures, \$200,000 at 6%; issued, \$35,000.

Property, the Lee group of 7 claims, 6 patented, about 10 miles N. of Patagonia. Claims show remnants of Tertiary lavas capping a series of limestones and other sedimentary rocks, altered by metamorphism and underlain by a dense black crystalline rock that carries ore. This rock, though seemingly devoid of crush zones or fissures, contains disseminated particles of chalcopryite with occasional bunches and patches of high-grade ore assaying as high as 27% copper and 100 oz. silver per ton. This rock also holds kidneys, or globular masses of primary copper glance and bornite. Ores are estimated to average about 5% copper, 2.5 oz. silver and 11 cts. gold per ton.

Development is by shafts of 400' and 80' and a drift tunnel, in ore for 160', with about 600' of workings. The shaft is dry, unlike that of the Hosey mine to the N. and the Happy Jack to the S., both in higher ground.

RUBY COPPER CO.**CALIFORNIA**

Address: E. A. Walters, Eureka, Cal. Antonio Licare, superintendent, Korbelt, Humboldt Co., Cal. Property, the Ruby group, shows a copper deposit developed by a 1,000' tunnel. Company plans installation of concentrator in near future.

RUBY COPPER CO.**NEVADA**

N. H. Falk of Eureka, Nev., vice-president. Property on Horse mountain, developed by 300' tunnel.

RUBY GOLD & COPPER CO.**ARIZONA**

Mine near Parker, Yuma Co., Ariz. C. H. Ferry, director and chief owner; W. E. Balcolm, gen. mgr., at last accounts. Company owns the Billy Mack mine, an old and well-known property, 8 miles by wagon road from Parker. Claims cover an area of pre-Cambrian limestone and schist, whose beds dip steeply N. W. Ore occurs as a contact vein between schist and limestone, the deposit being an irregular replacement with no known connection between the small ore pockets. Ore consists chiefly of malachite, chrysocolla and specularite with porous quartz. In the main mine workings a bunch a few feet across consisted of a mass of needle malachite shot through with threads and stringers of gold. As a rule the ore, though often rich, occurs in short and very thin bunches and so far as known, does not afford a basis for profitable mining on a large scale.

Developed by 200' shaft with levels at 100', 150' and 200', below surface and by several lesser prospect tunnels and inclines. Is too pocketty to make a big mine.

RUBY HILL TUNNEL & MINING CO.**NEVADA**

Mine office: Eureka, Eureka Co., Nev. A. P. Mayberry, superintendent, at last accounts. Lands, between the Richmond and Connor mines, are opened by a tunnel, said to be 2,200' long. No returns secured.

RUBY KING COPPER CO.**CALIFORNIA**

Mine at Ladoga, Colusa Co., Cal., developed by 1,200' shaft and 1,000' tunnel. Although generally known as a copper mine, no copper ore has as yet been discovered and property is operated as a mineral paint mine, ore being iron oxide.

RUBY MINE.**MONTANA**

Pat Dowling, owner, Ruby Mine, Lowland creek, via Basin, Jefferson Co., Mont. Property comprises a group of contiguous claims covering the old Ruby and adjoining Columbia mines; the first was a producer of remarkably rich gold-silver ore from a "pipe" of quartz in dacite, terminated downward by a flat clay slip. In summer of 1913, a new deposit of high-grade copper ore was discovered by the present owner in doing development work on a virgin section of the group.

RUBY MINING CO.**WASHINGTON**

Mine and home office: Nighthawk, Okanogan Co., Wash. Eastern office: Mansfield, Ohio. Monroe Harman, pres. and gen. mgr.; Jas. A. Hower, vice-pres.; Chas. B. Bushnell, sec.-treas.; preceding officers, Dr. S. P. Ecki and M. L. Branyan, directors. Organized Nov. 5, 1902, under laws of Washington, capitalization \$1,500,000, shares \$1 par, nonassessable; issued, \$1,175,000. Bonds, \$100,000 authorized, at 7% maturing 1915; issued, \$35,100. Annual meeting, second Tuesday in June.

Property, 7 claims, unpatented, 136 acres, with 46 acres miscellaneous freehold lands, on Mt. Chopaca, near the Similkameen river, 3 miles south of the international boundary and within 600' of the Great Northern railroad. Claims show syenite, cut by veins containing lenticular orebodies running N. W.-S. E. and dipping at 47°. The vein under development is

about 4' thick, traceable for 1,000', and carries cupriferous ore stated by management to assay 0.5 to 10% copper, 1.5% lead, 2.5% zinc, 5 to 2,800 oz. silver and from a trace to \$4 gold per ton.

Development is by 3 crosscut tunnels with drifts on the vein. The main working tunnel, 300' below the old workings and about 350' below the outcrop, is 1,110' long, and has 550' of drifting on the vein and an equal amount of drifting run from a 100' upraise. An inclined shaft sunk on the vein from the lower tunnel has short levels at 100' and 200' depth. The development work is said to have blocked out 135,000 tons of ore carrying 30 oz. silver besides copper and gold values and which it is believed can be profitably mined and milled.

Equipment, installed 1909, includes a 15-h. p. electric hoist and 5 buildings. Ore shipments of 7 carloads, 1907, netted \$5,500. Management is trying to raise \$35,000 for the erection of a mill and compressor in order to put the property on a producing basis before bonds mature in April, 1915. Company's report shows a total expenditure at the mine from beginning of work to April 28, 1913, of \$118,000, of which ore sales furnished \$17,062, bonds \$35,100 and stockholders (175,000 shares) \$65,838.

Property promises to make a good small mine.

RUDOLPH LAND CO.

WISCONSIN

Mine near Gordon, Douglas Co., Wis. Cuyler Adam, gen. mgr.; L. A. Barton, supt., at last accounts. Organized 1905, as successor of Minong Range Copper Co. Lands, 12 miles from Gordon, are in Secs. 11, 12, 13 and 14, T. 43 N., R. 10 W., on the southern fold of the Keweenaw syncline. Development is by two 7x10' shafts, deepest 350', sunk at an angle of 36°, on a dark amygdaloidal trap bed carrying small quantities of native copper. Equipment includes a 6-stamp mill. Property fully described under title of Minong Range Copper Co., Vol. III.

RUSH & BROWN GROUP.

ALASKA

Address: Kasaan, Prince of Wales island, Alaska. U. S. Rush, mgr., and Geo. F. Brown, owners. Property, 8 claims, 160 acres and 15 acres mill site, near the end of Kasaan bay, 8 miles N. W. of Kasaan.

Two orebodies have been developed, one a contact metamorphic deposit consisting of a copper-bearing magnetite body, 100' long by 30' wide, in a garnet-epidote-calcite gangue lying between granodiorite and an indurated greenstone tuff, the line of contact striking nearly east and west. The other deposit, 160' to the north, is 4 to 8' wide, occupies a shear zone in the greenstone tuff and conglomerate beds and is a sulphide body composed of pyrite and chalcopyrite in a quartz-calcite gangue. The strike of this sulphide deposit is N. E. and its dip 60° S. E. toward the larger deposit.

Development consists of 3 tunnels and a 184' shaft with drifting on the 1st and 2nd levels, from which ore was stoped in 1912. Some work was also done in 1912 on the Copper Mountain claim, long idle.

Equipment includes a steam plant with hoist and necessary mine buildings. Ore is taken over a 3-mile private railway of 42" gauge to Kasaan bay. Work was suspended, 1907, because of the depression of the metal market and was resumed July, 1910. About 20,000 tons of ore have been shipped from the 100' level.

Production for 1912 was about 700,000 lbs. fine copper with small gold and silver values. Property operated with force of 20 men in 1913, shipping ore regularly to Tacoma. Mine considered promising, but like all deposits of this type, of uncertain downward extent.

RUSSIA-JAPAN MINE.

WASHINGTON

Andrew and Arthur Raub, owners, Methow, Okanogan Co., Wash. Property consists of 2 claims, held by annual assessment work for 17 years

and located 50 miles from a railroad. The claims show a vein 5 to 7' wide, opened by a 175' tunnel whose face is reported to show 5' of 17% ore.

RUTH-FRANCIS GROUP.

BRITISH COLUMBIA

J. H. Nesbitt and A. Archie, owners, Stewart, B. C. Mine in the Portland Canal division, Skeena district, B. C., on the North fork of Glacier creek. Development by 64' tunnel has exposed an ore shoot of silver-lead-copper ore about 10' wide in the face of the tunnel.

RYE PATCH CONSOLIDATED MINES CO.

NEVADA

Property at Rye Patch, Humboldt Co., Nev., leased for 7 years to Rye Patch Mining & Leasing Co. and described under that title.

RYE PATCH MINING & LEASING CO.

NEVADA

Office: Salt Lake City, Utah. Mine at Rye Patch, Humboldt Co., Nev. C. A. Conklin, pres.; S. A. Greenwood, sec.; David W. Jeffs, gen. mgr. Organized 1910, under laws of Utah, as a reorganization of the Rye Patch Consolidated Mines Co. Capitalization \$250,000, shares 25 cts. par, assessable.

Property, 6 claims, patented, held under a 7-year lease. Mine is 14 miles from a railway and is said to have been worked extensively, prior to 1873, with a reputed production of \$12,000,000 in silver. Development consists of a 1,200' tunnel in which the present company started new work and developed a 14" vein of extremely rich silver ore carrying 4 to 9% copper.

Equipment includes a 10-stamp mill with a concentrator and company is preparing to operate on an extensive scale as soon as new ground is opened up.

SACAJEWEA GOLD & COPPER MINING CO.

MONTANA

Office: 11 Broadway, New York. Mine near Helena, Mont. Col. Henry Altman, pres. and gen. mgr.; W. J. Anson, sec. Capitalization \$5,000,000, shares \$10 par. Lands, 47 claims, in the Scratch Gravel district, adjoining the Copper-Silver Montana Mining Co. Idle some years, and presumably defunct.

SACRAMENTO MINE.

ARIZONA

Owned by Copper Queen Consolidated Mining Co., at Bisbee, Ariz.

SACRAMENTO VALLEY COPPER CO.

CALIFORNIA

Office: Placerville, Cal. Mine office: Greenwood, El Dorado Co., Cal. L. H. Wilkins, pres., J. J. Crawford, Wm. Sherrieff, E. C. Voorhies and Donald Woodrum, directors; Thos. G. Patton, sec.-treas.

Organized under laws of Arizona, capitalization \$1,000,000, shares \$1 par. Title to property is held through the Sacramento Valley Copper Co. of California.

Lands, 12 claims, patented, about 220 acres, in Sec. 24, T. 12 N., R. 9 E., in the Greenwood district. The property shows an extensive series of sedimentary rocks, with igneous rocks of various ages, intercalated with the sedimentaries, or more commonly occurring as intrusives. Ores occur as sulphide deposits in contact and shear zones. The latter are flat-lying, with chalcopyrite disseminated in pyrite, almost invariably auriferous, but low in copper tenor.

The mine has an 80' shaft, and several short tunnels. There is no power equipment. Property considered promising.

SADDLE MOUNTAIN MINING CO.

ARIZONA

Office: 902 Chapel St., New Haven, Conn. Lewis S. Welch, pres.; Clarence Stephens, vice-pres.; Story B. Ladd, sec.; Wilbur W. Delano, treas. Organized 1902, under laws of Arizona, capitalization \$1,000,000, increased later to \$2,500,000, shares \$1 par. Bonds, \$1,000,000, first-mortgage, 6%, due July 1, 1918, which have been assumed by the Gila Copper Sulphide Co. Property consists only of \$300,000 of the capital stock of the Gila Copper

Sulphide Co. The former mining property at Christmas and Saddle mountain was sold, Oct. 26, 1909, to the Gila Copper Sulphide Co. Very fully described Vol. VIII.

SAGAMORE MINING CO.

CALIFORNIA

Office: Third and Chestnut Sts., Philadelphia, Pa. Mine near Purdy, San Bernardino Co., Cal. Norman P. Sloan, pres. and mgr.

Lands, 8 claims, 160 acres, known as the New York mine, 5 miles S. E. of Manvel, in the New York mountains, an extension of the Providence range. The property shows limestone, quartzite and schist, with intrusive dikes of rhyolite and felsite along which the principal veins are found. Ores found in the quartzite are gold bearing, the silver and copper ores being in limestone.

Development is by shafts of 30', 45', 100' and 150' and several tunnels, longest being 454', showing a number of veins ranging from 18" to 4' in width. A complete report on the property was made, 1902, by Carl Andersen.

Equipment includes gasoline power and a 50-ton mill. Idle several years.

ST. CROIX CONSOLIDATED COPPER CO.

WISCONSIN

Office and mine: Superior, Douglas Co., Wis. Robt. Kelley, pres.; Dr. A. S. Andrews, vice-pres.; W. W. Strickland, sec.; Ernest A. Arnold, treas. and managing director. Organized 1903, under laws of Wisconsin, capitalization \$1,500,000, shares \$1 par, nonassessable. Lands, about 15,000 acres, 35 miles south of Lake Superior, on the St. Croix range of Douglas county, Wis., carry the western extension of the Keweenaw copper belt of Lake Superior. The corporation is a land-holding company that has done no mining work and plans none.

ST. EUGENE MINE.

BRITISH COLUMBIA

Owned by Consolidated Mining & Smelting Co. of Canada, Ltd.

ST. JOE GOLD-COPPER M. & M. CO.

MONTANA

Office: Wallace, Idaho. Lands, 9 claims, well timbered, on Kelly creek, near Saltese, 3 miles west of the Monitor mine, and one-half mile from a railroad, showing 2 strong ledges. Idle some years, but presumably again active in 1913, owing to a renaissance of mining interest in this section.

ST. JOE MINING & MILLING CO.

WASHINGTON

Idle. Office and mine: Latah, Spokane Co., Wash. I. H. Stockdale, pres.; J. W. Olney, vice-pres.; J. A. Adams, sec.-treas., at last accounts. Organized 1906, under laws of Washington, capitalization \$7,500,000, shares \$5 par.

Lands, 13 claims, one fractional, about 255 acres, well timbered, 15 miles from the Puget Sound railway, show quartzite, with shafts of 20' and 80'. Property has 3 buildings.

ST. LAWRENCE COPPER MINING CO.

MONTANA

Mine office: Saltese, Missoula Co., Mont. Thos. Jay, superintendent at last accounts. Lands, about 6 miles S. W. of Saltese, have a 10' vein, paralleling the vein of the Richmond and Monitor mines, of about 10' average width. Veins carry gold and silver-copper ore, giving assays up to 42% copper. Idle.

ST. LOUIS COPPER CO.

MICHIGAN

Office: 12 Ashburton Place, Boston. Mine office: Calumet, Houghton Co., Mich. Jas. MacNaughton, general manager. Organized under laws of Michigan, capitalization \$1,000,000, shares \$25 par, fully issued. Is controlled by the Calumet & Hecla Mining Co., through ownership of entire share capital.

Property, lying next south of the Old Colony, east of the Laurium and S. E. of the Calumet & Hecla, was opened 1844, as the New York & Michigan, under permit from the Federal War Department, and later became the

Washington, changing that name eventually to the present title. Lands, 800 acres, being S. $\frac{1}{2}$ of Sec. 19 and W. $\frac{1}{2}$ of Sec. 20, T. 56 N., R. 32 W.

In very early days a shaft showing some fine copper was sunk at the junction between the trap belt and the eastern sandstone. Idle many years, until 1910, when exploratory work was resumed. A cross-section of the formation was made, 1910-12, and ground broken for a shaft, on the St. Louis amygdaloidal bed, July, 1911. The shaft was 600' deep, Aug., 1912. Diamond drilling, in 1912, is thought to have located the extension of the so-called Mayflower lode.

Equipment includes a 14x18" duplex-cylinder Lidgerwood hoist, with 5' drum, good for one-half mile depth, and a 12-drill air compressor.

ST. LOUIS GOLD GULCH MINING CO.

NEW MEXICO

Mine office: Silver City, Grant Co., N. M. G. A. Easton, manager, at last accounts. Property shows gold and copper ores, and equipment includes a 50-ton concentrator. Idle.

ST. MARY'S MINERAL LAND CO.

MICHIGAN

Office: 705 Sears Bldg., Boston, Mass. Mine office: Houghton, Houghton Co., Mich. Geo. Peabody Gardner, pres.; Chas. J. Paine, vice-pres.; Chas. J. Paine, Jr., sec.-treas.; preceding officers, E. V. R. Thayer, Nathaniel H. Stone, Walter Hunnewell, Albert S. Bigelow, Thos. N. Perkins, Charles E. Perkins, Richard Olney and Chas. N. King, directors; Fredric W. Nichols, resident agt.; Dr. Lucius L. Hubbard, cons. geologist.

Share assets of the company, July 31, 1912, were: 50,000 shares Champion Copper Co., 25,000 shares Mayflower Mining Co., 20,165 shares La Salle Copper Co., 20,000 shares Hancock Consolidated Mining Co., 20,000 shares Pacific Copper Co., 37,222 shares Houghton Copper Co., 1,571 shares Franklin Mining Co., 9,000 shares North Lake Copper Co., 2,000 shares Ojibway Mining Co., 56,778 shares Winona Copper Co., 208 shares Copper Range Consolidated Copper Co., 640 shares St. Mary's Mineral Land Co., 80 shares Old Colony Copper Co., 6,340 shares Naumkeag Copper Co., 18,162 shares Douglas Copper Co., 10 shares Amphidrome Co.

Lands, July 31, 1912, were 93,084 acres freehold, with mineral rights to 14,081 acres additional, property being scattered along the Lake Superior copper belt, with principal holdings on the South Range, S. W. of Houghton, in Houghton and Ontonagon counties.

Organized March 4, 1901, under laws of New Jersey, capitalization \$5,000,000, shares \$25 par; issued, \$4,000,000. Controls, through ownership of entire stock issue, except founders' shares, the St. Mary's Canal Mineral Land Co., a corporation organized 1863, under laws of New York, to acquire 180,000 acres of land given by the state of Michigan for the construction of the first ship canal at Sault Ste. Marie. These lands in Houghton, Ontonagon and Keweenaw counties, Mich., formerly included the tracts on which the Calumet & Hecla, Baltic, Trimountain, Champion, Ojibway and other mines have been developed. Company has about 400 shareholders. Shares are listed on the Boston Stock Exchange. Old Colony Trust Co., Boston, registrar. Annual meeting, first Wednesday in March, in Jersey City, N. J.

From 1863 to 1900 the old company paid cash dividends of \$2,200,000, and also paid stock dividends of 1 share of Tamarack, 1884; 1 share of Iroquois, 1890; $1\frac{1}{4}$ shares of Baltic and one-half share of Winona, 1898; 1 share of Old Colony and $1\frac{1}{2}$ shares of Trimountain in 1899. Dividends of the present company have been as follows: \$1 in 1903; \$1 in 1904; \$2 in 1905; \$4 in 1906; \$5 in 1907; nothing in 1908; \$1 in 1909; \$1 and a stock dividend of one-fifth share of Franklin, 1910; \$3 in 1911; \$3 in 1912; \$2 to Nov. 1, 1913. Income of the company consists mainly of dividends from the Champion Copper Co., with a small but steady income from sales of lands, timber and

wood, and occasional but irregular large receipts from sales of mineral lands. The balance sheet of Dec. 31, 1909, gave quick assets of \$4,489,273, and on Dec. 31, 1912, the company had \$150,370 cash on hand, with notes receivable and sundry shareholdings of \$215,000, and was without liabilities.

The Challenge mine, described Vol. VIII, was abandoned Aug., 1909, after the expenditure of about \$250,000.

The company, since its reconstruction, in 1900, has refused to sell its mineral lands, outright, preferring to join with other land holders in the formation of new companies, taking pay for its lands in shares, on a pro rata basis, or partly in shares and partly in cash. This policy involves heavy outlays for exploratory and development work, but has resulted in giving the company a half interest in a new mine, the Champion, which is capable, alone, of furnishing funds to St. Mary's company for both dividends and development work elsewhere, and a continuance of this policy must result in time in making St. Mary's Mineral Land Co. the part or sole owner of a number of fine mines. Owing to the great extent of its lands, located mainly on the Keweenaw copper belt, stretching along the mineral range for scores of miles, the landed holdings of the company are of great potential value. The management is vigorous and far-seeing.

ST. MARY MINING CO.

UTAH

Office: 601 Providence Bldg., Duluth, Minn. Mine office: Milford, Beaver Co., Utah. Hansen Ev. Smith, pres.; J. Eton Bowers, vice-pres.; Paul M. T. Thompson, sec., all of Duluth. Organized 1908, under laws of Arizona, capitalization \$500,000, shares \$1 par, assessable.

Property, 4 claims, 3 of 30 acres area, patented near the Moscow and Red Warrior mines, on the east side of Topache peak, 4 miles from Milford in the Star district. Claims show 5 contact veins between limestone and an igneous intrusive. Orebody under development claimed to average 17% copper, 10 oz. silver and one carload said to have returned \$76 per ton. Development consists of a 165' shaft with several hundred feet of drifts.

The mine, opened about 1870, produced considerable ore until 1890. After many years idleness, mine was again opened in 1909 and has been operated intermittently since then, producing about 270 tons of ore in 1910 and 1912.

ST. PATRICK MINING & MILLING CO.

UTAH

Office: 855 Sherman Ave., Salt Lake City, Utah. Mine office: Hughes Canyon, Salt Lake Co., Utah. D. A. Buck, pres.; H. H. Paterson, vice-pres.; B. A. M. Froiseth, sec.-treas. Organized March 17, 1906, under laws of Utah, capitalization \$50,000, shares 20 cts. par, nonassessable; issued, 180,000 shares. Lands, 6 claims, unpatented, 7 miles from railroad, opened by shaft and tunnel, with about 650' of workings, showing gold and silver-copper ore. Idle except for annual assessment work.

ST. PAUL MINING & REDUCTION CO.

COLORADO

Mine office: Silverton, San Juan Co., Colo. Norwood Johnson, pres. and treas.; J. B. Ross, vice-pres. and gen. mgr.; Frank L. Ross, sec., at last accounts. Organized March, 1908, under laws of Colorado, capitalization \$100,000, shares \$1 par. Owns 1 claim, in the Red Mountain district, an old mine that formerly shipped some ore netting \$1,000 per carload. The mine has a 300' shaft, with levels at 200' and 300', developing small but rich ore shoots, said by management to carry about 8% copper, 10% lead, 10% zinc, 5 to 10 oz. silver and 1 oz. gold per ton. Presumably idle.

ST. REGIS COPPER MINING CO., LTD.

MONTANA

Mine office: St. Regis, Missoula Co., Mont. G. F. Franklin, superintendent. Organized March, 1906. Lands, bought for \$35,000, are developed by tunnels of 400 to 500', showing several well-defined veins, carrying gold-copper ore.

ST. REGIS COPPER MINING & MILLING CO.**MONTANA**

Office: Missoula, Mont. Mine office: St. Regis, Missoula Co., Mont. S. J. Wilson, pres.; F. W. Wilson, sec.-treas.; Peter Strobel, supt. Organized May, 1901, under laws of Montana, capitalization \$300,000, shares \$1 par, in half preferred and half common stock.

Lands, 5 claims, also a 15-acre mill site and miscellaneous lands, 180 acres, on the Northern Pacific railway. Property shows quartzite and shale, with 2 orebodies under development of 6' estimated average width, carrying chalcopryite ore said to give average assays of 8% copper and \$1.50 gold per ton. Development is by tunnels of 60', 380', 800' and 600'.

ST. VALENTINE GOLD & COPPER MINING CO.**ARIZONA**

Office: Sawtelle, Cal. Mine office: Parker, Yuma Co., Ariz. S. S. Denton, president and general manager, at last accounts. The mine was developing with a small force in 1910.

SALIDA COPPER CO.**COLORADO**

Office: 16 State St., Boston, Mass. Operating office: 709 Colorado Bldg., Denver, Colo. Mine office: Salida, Chaffee Co., Colo. Lester C. Wead, pres.; Edw. C. Williams, sec.; Wm. Tudor, treas., at last accounts. Organized Oct. 26, 1908, under laws of Arizona, capitalization \$500,000, shares \$1 par. Controls the Mountain Mining Co., of Georgetown, Clear Creek Co., Colo., through stock ownership. Property was formerly held by the Shawmut Consolidated Copper Co., which this company seems to have succeeded.

Lands, about 200 acres, 5 miles from Salida, include the Sedalia mine, 1 patented claim, 20 acres. Company is also said to hold 60 acres of patented ground under bond and lease. The Sedalia mine has a vein of 35 to 40' estimated average width, carrying oxidized copper ores, mainly below smelting tenor, to shallow depth, succeeded by chalcopryite ore said to average 3 to 4% copper and \$1.40 per ton in combined gold and silver values, but also carrying an average of 4.5% zinc. The mine is developed mainly by a 2,000' tunnel to depth of 700' and is said to have about 2½ mi. of workings.

Equipment includes electric power and an 8-drill air compressor and the mine is connected with the mill by a 1½-mile tramway.

The 50-ton reduction plant, known as the Colorado mill, includes a concentrator and leaching plant, 76x119' in size and 4 stories high. The leaching plant, idle for some years, is said to have effected an extraction of 77% of assay values, as against an extraction of 85% of assay values in the

SALINA GROUP.**WASHINGTON**

Mine address: Rock Cut, Ferry Co., Wash. C. F. Taylor, owner. Lands, 3 claims, on the Kettle river, in the Orient district, well timbered, showing copper ore said to carry an average of 6.5% copper and \$1.60 in combined gold and silver values.

SALISBURY COPPER CO.**NORTH CAROLINA**

Idle. Address: Capt. W. M. Wiley, Salisbury, N. C. Mine near Gold Hill, Rowan Co., N. C. T. B. Brown, pres.; W. S. Blackmer, sec.-treas.; Richard Eames, Jr., gen. mgr., at last accounts. Organized 1904, under laws of Arizona, capitalization \$100,000, shares \$100 par.

Lands, 50 acres, freehold, showing altered schists, carrying a fissure vein with N.-E. strike, and estimated at 4' width. Developed by a 100' shaft, showing chalcopryite reported to average 5% copper and \$5 gold per ton. Is unfavorably regarded.

SALMON RIVER MINING CO.**NEVADA**

Office: 19 West Granite St., Butte, Mont. Mine near Contact, Elko Co., Nev., carries gold and silver-bearing copper ore. Had gasoline power and a small smelter. No returns secured.

SALMON RIVER MINING & MILLING CO.**WASHINGTON**

Mine office: Conconully, Okanogan Co., Wash. Wm. McDaniel, manager, at last accounts. Lands, on Peacock mountain, are said to give a fair showing of copper. Development by tunnel was planned. Idle.

SALT LAKE-CALIFORNIA COPPER CO.**CALIFORNIA**

Office: 302 Hooper Blk., Salt Lake City, Utah. Mine office: Smith River, Del Norte Co., Cal. W. Mont Ferry, pres.; Isaac Sparey, vice-pres.; J. H. Turner, sec.-treas. and gen. mgr.; preceding officers, C. W. Hoover, Jas. Ivers and L. A. Mehse, directors. Organized Nov. 29, 1907, under laws of Utah, capitalization \$1,000,000, shares \$1 par, nonassessable; issued, \$841,615.

Lands, 14 claims, unpatented, near Smith river, in the Low Divide district, 120 miles S. W. of Grants Pass, on the S. P. R. R. and 12 miles from the coast. The mine, which was one of the first copper properties on the Pacific coast, was operated 1857-67, when closed by the low price of copper. Claims show 4 parallel shear zones, with prominent gossans, traceable about 3 miles, ore occurring in lenticular masses and shoots, in serpentine or altered peridotite. The zone has a N.-S. strike, and average dip of about 70°, the orebodies ranging 3 to 16' in width, carrying chalcocite and chalcopyrite, estimated by the management to average about 16% copper, which presumably is from selected ores. The mine has a 180' shaft, with about 3,500' of workings. Old workings are said to extend down to the 500' level.

There are 3 mine buildings. Small shipments, 1907-08, returned 16 to 30% copper, and production 1908, was 300 tons of ore, shipped by sea giving returns of 16 to 30% copper, with an average of about 20%, estimated to have yielded 120,000 lbs. fine copper. Idle, except for annual assessment work, since early 1910, with no immediate plans for resumption. Property is for sale.

SALT LAKE COPPER CO.**UTAH**

Office: 11 Broadway, New York. Operating office: McIntyre Bldg., Salt Lake City, Utah. Mine office: Lucin, Box Elder Co., Utah. Frederick Lewisohn, vice-pres.; E. C. Westervelt, treas.; other directors, Walter Lewisohn, S. W. Peck, E. H. Westlake, E. J. Macnamara, Philip S. Henry, O. B. Van Sant and J. E. Schoenberg; Geo. B. Wilson, mgr. Organized Oct. 10, 1906, under laws of Maine, capitalization \$2,200,000, shares \$10 par. Debentures \$118,000, at 6%, payable out of net earnings.

Lands, 108 claims, known as the Copper Mountain mine, at an elevation of 7,200' above sea level, in the Newfoundland district, and 100 acres within the limits of Salt Lake City.

The Copper Mountain mine has a number of tunnels and shafts, the 1,500' main tunnel having a back of about 400', and a 500' tunnel has been planned to be driven 1,200', to enter the hoped-for sulphide zone. The mine has upwards of 2 miles of workings, and was estimated, in 1908, to have in sight and blocked out, 75,306 tons of copper ore of 1.1% average tenor, not at present commercial ore; 27,960 tons of 3.13% copper ore, and 138,370 tons of ore of 7.2% copper tenor. Ore shipped, apparently all oxidized, has averaged about 7% copper tenor. Production, 1912, was 5,498 tons of ore, yielding 833,926 lbs. copper.

SALT LAKE GROUP.**NEVADA**

Office: Contact, Elko Co., Nev. W. F. McArdle, superintendent. Lands, 17 claims. Property shows an area of monzonite, impregnated with copper minerals and with commercial ore at a depth of 40 to 150', as proven by shaft work. Development is by a shaft 75' deep, Oct., 1913.

Equipment includes a small hoist and other necessary development machinery.

SALTESE CONS. COPPER MINING & MILLING CO. MONTANA

Reorganized March, 1911, as the Saltese Mining & Milling Co.

SALTESE MINING & MILLING CO. MONTANA

Address: C. I. Grismoe, secretary, Mullan, Idaho. Mine near Saltese, Missoula Co., Mont. A. P. McRae, pres.; O. V. Manring, treas.; preceding officers, J. B. Ward and Patrick Gleason, directors, at last accounts. Organized March, 1911, as the successor of the Saltese Cons. Copper Mining & Milling Co., capitalization \$1,500,000, shares \$1 par, assessable. Levied an assessment of 1 mill per share, Sept. 16, 1911.

Lands, 12 claims, 240 acres, east of Mullan, near the National mine in the St. Regis district, about 8 miles N. W. of Saltese. The Property is developed by 2 tunnels aggregating 1,000'. The lower one, 655' in length, opens a 13' vein, probably the Black Traveler vein, at 460' from the portal, which is said to show 5' of high-grade copper ore. The tunnel is being extended to cut the big iron-capped vein seen on the surface. Property considered promising.

SALTILLO, S. A.; COMPAÑÍA MINERA DEL. MEXICO

Office: Primera de Galeana No. 2, Saltillo, Coahuila, Mex. Mine and works office: Mazapil, Zacatecas, Mex. Lic. Miguel Cárdenas, pres.; Ramón J. Rodríguez, vice-pres.; Pedro García León, sec.; Dámaso Rodríguez Fuentes, treas.; Ing. Camilo Figueroa, gen. mgr., directors; Serapio Chavez, mine supt.; Regulo Fuentes, mill supt. Organized June 15, 1899, under laws of Mexico, capitalization 100,000 pesos, shares 100 pesos par, fully paid. Dividends were 10,000 pesos in 1907; 15,000 pesos in 1908. Annual meeting, Jan. 31, each year.

Owens the Jesus Nazareno mine with 116 acres of mineral land and 2,099 hectares of miscellaneous lands, in the Nazareno mining district of Mazapil, 10 miles from a railway. The mine has an orebody carrying auriferous lead and copper sulphides sufficiently developed to produce 1,000 metric tons of silver-lead ore monthly. The company has a 5-mile private tram line, and is equipped with a 135-h. p. gas and electric plant.

SALTILLO MINING & MILLING CO. MEXICO

Mine office: El Salado, Catorce, San Luis Potosí, Mex. Merle M. Stewart, gen. mgr., at last accounts. Property is El Saltillito mine, developed by shafts and tunnels, carrying gold and silver-bearing copper ores, with values mainly in the precious metals. Equipment includes steam and electric power, and there is a 3-stamp mill. Presumably idle.

SAMSON MINING CO. UTAH

Is a subsidiary of the Bingham Mines Co., under which title the property is described.

SAN ACASIO y ANEXAS; COMPAÑÍA MINERA DE. MEXICO

Mine office: San Juan de Guadalupe, Durango, Mex. Property includes the San Acasio and Tres Rosas mines, carrying gold and copper ores. Has steam power. Presumably idle.

SAN ANTONIO COPPER CO. MEXICO

Address: Geo. J. Eisele, sec.-treas., Iron Mountain, Mich. Mine office: San Antonio de la Huerta, Sonora, Mex. Otto C. Davidson, pres.; Dr. J. A. Crowell, vice-pres.; preceding officers, John Uno Sebenius, D. M. Clemson, Hon. Richard C. Flanagan, E. G. Kingsford and W. H. Johnston, directors; John E. McIntyre, supt. Organized Sept. 23, 1908, under laws of Arizona, capitalization \$2,500,000, shares \$10 par; issued, \$1,000,000 full paid and \$1,000,000, with \$3.50 paid on the latter. Direct title is held through the San Antonio Copper Co., S. A., organized April 12, 1908, under laws of Mexico,

with all stock owned by this company. Statement of June 1 showed a cash balance of \$6,000 with no liabilities. Annual meeting, second Monday in April.

Lands, 9 groups, about 7,500 acres, with 2,000 acres about 3 miles from San Antonio de la Huerta, near the Yaqui river. The property was worked 1862 in a small way.

Lands show a mineralized zone of 200 to 500' width. Ore includes high-grade oxides and carbonates, with sulphides of good average tenor, there being a considerable quantity of chalcocite, giving assays up to 11% copper. Development work consists of 20 tunnels with 15,000' total workings, opening 7 separate orebodies in 2 tunnels, with 4,000' of workings in ore. Mr. Dwight E. Woodbridge estimated, March 4, 1910, that the San Antonio had exposed on 1 plane, 300,000 tons of ore, figured conservatively, averaging 7% copper, with very low values in the precious metals, and that the newer tunnels should increase this tonnage five-fold. Railway connections to within 2.2 miles of the main tunnels were secured, 1910, and will be extended to the tunnel mouth as soon as peace prevails again. Operations were suspended Aug. 1, 1912, on account of revolutionary disturbances. Property considered promising and management good.

SAN ANTONIO MINING CO.

COLORADO

Office: 312 Century Bldg., Denver, Colo. Mine office: Red Mountain, Ouray Co., Colo. M. T. Chestnut, pres. and gen. mgr.; Otto Koehler, vice-pres.; Wm. L. Stephens, sec.-treas., at last accounts. Organized Feb. 5, 1908, under laws of Colorado, capitalization \$500,000, shares \$1 par.

Lands, 30 claims, about 200 acres, a 20-acre mill site and 10 acres miscellaneous lands, 1 mile from a railway, in the Red Mountain district of Ouray and San Juan counties. Property, including the Carbon Lake mine, shows porphyry, carrying several orebodies, estimated at 20 to 30' width, traceable for more than 3,000' and reported by the company to show enargite ore carrying 12% copper, 10% lead, 10 oz. silver and \$3 gold per ton, which is from a narrow paystreak.

Development is by shafts of 37' and 200', the Camp Robber tunnel of 625', and the Koehler tunnel of 2,800', with a back of about 500'. Equipment includes a 5-drill air compressor and there are 10 mine buildings and dwellings. Idle several years.

SAN BERNABE y ANEXAS; COMPAÑÍA MINERA.

MEXICO

Office and mine: Zacatecas, Zacatecas, Mex. C. A. Bentley, manager, at last accounts. Lands, 25 hectares, including La Confianza, El Faro and La Fama mines, west of the Malanoche mine. Lands include the oldest mine in Zacatecas, discovered about A. D. 1546, which was a considerable producer of silver. Property formerly was under option to an English company, but option was dropped after unwatering the old shaft. Ore is copper, associated with some lead, values being mainly in silver.

SAN BERNARDO MINING CO.

MEXICO

Is the Mexican incorporation of the Southern Sonora Development Co., controlled by the Sonora Central Mines Co.

SAN CRISTOBAL COPPER CO.

NEW MEXICO

Letter unclaimed at 116 Broad St., New York. Mine Office: Arroyo Seco, Taos Co., N. M. Richard Hopkins, pres.; B. F. Shakespeare, sec.; J. K. Turner, mgr., at last accounts. Organized 1901, as successor of Rio Hondo Copper Mining Co. Lands, 1,850 acres, with water rights and a railroad franchise. The mine has an 80' vein carrying copper, gold, silver and lead ores, opened by a 1,000' tunnel. Original development was for copper, but later operations have been confined to developing a big ledge of gold-bearing quartz. Equipment includes a 10-stamp mill and 25-ton cyanide plant, and there is said to be a small smelter. No returns secured.

SAN FELIPE MINING CO.**MEXICO**

Office: Philadelphia, Pa. Mine office: Hostotipaquillo, Jalisco, Mex. Col. N. Z. Seitz, president and general manager, at last accounts. Organized 1902, under laws of Arizona, capitalization \$1,000,000, shares \$1 par. The property includes a mill, claimed to have 50 tons daily capacity. The company is said to have paid dividends from stock sales and was considered by Horace J. Stevens as a rank bit of stockjobbery. Idle and probably defunct.

SAN FERNANDO; MINA.**MEXICO**

Idle. Office: San Fernando, Durango, Mex. John T. Canfield, manager, at last accounts. Property includes La Fortuna group, carrying gold and silver-copper ores. Equipped with water and electric power, a 100-ton concentrator and a 40-ton smelter. The property was operated formerly by the Fernando Copper Mining Co., and it is generally understood that the mine was effectively robbed before abandonment.

SAN FRANCISCO GROUP.**MEXICO**

Mine office: Matehuala, San Luis Potosí, Mex. W. B. A. Dingwall, manager. Property includes the San Francisco and San Miguel mines, carrying gold, silver and copper ores. Has steam power, lixiviation plant and a 50-ton mill. Property reported under option to Guggenheim interests in 1912.

SAN JUAN BAUTISTA MINING CO.**MEXICO**

Office: 513 Ouray Bldg., Washington, D. C. Mine office: Moctezuma, Sonora, Mex. Dr. F. S. Chamberlain, pres.; A. G. Drake, sec. and mgr.; Wm. Carter, treas.; Geo. F. Woodward, gen. mgr.; Wm. M. Reese, supt., at last accounts. Organized March, 1906, under laws of Arizona, capitalization \$5,000,000, shares \$10 par.

Lands, 19 claims, on El Cerro Rosario, include antiguas showing large slag dumps, remaining from ancient smelting operations. Property carries a mineralized zone between limestone and porphyry of about 1,000' claimed width, traceable nearly 1,500'. Development is by a 2-compartment 100' shaft on the Rosario claim, also shafts of 50' and 126' on other claims. La Bronzosa mine carries argentite, stephanite and chalcopryrite ores with pyrite, and La Cobrizza mine is said to show 30' of ore carrying highly argentiferous cuprite. Idle several years.

SAN JUAN GRANDE MINE.**MEXICO**

Address: Soyopa, Sonora, Mex. R. E. Faver and A. G. Pace, owners. Property, 12 miles from Soyopa, is developed by 3 shafts of 50', 50' and 25', and a short tunnel, showing a 2' vein of copper ore, said to assay up to 50% copper, 30 oz. silver and \$10 gold per ton. The mine has no power equipment.

SAN LAZARUS MINES CO.**NEW MEXICO**

Idle. Office: 2837 Hennepin Ave., Minneapolis, Minn. Mine near San Pedro, Santa Fé Co., N. M. R. C. Thompson, pres.; Dr. Edw. Gorgen, vice-pres.; L. J. Hemen, sec.; Clarence R. Thompson, treas.; Geo. W. Churchill, gen. mgr. Organized March 9, 1904, under laws of New Mexico, capitalization \$2,000,000, shares \$1 par, nonassessable; issued, \$1,500,000.

Lands, 10 claims, unpatented, 200 acres, show a contact deposit between syenite and limestone, of 3' average width, N.-S. strike and dip of 15 to 25°. This deposit carries copper carbonates and chalcopryrite ore estimated by the management to average 3 to 12% copper, without lead or zinc, 15 oz. silver and \$2 to \$6 gold per ton. Lands are in 3 groups, 2 miles from San Pedro, adjoining the Santa Fé Gold & Copper Mining Co. Development is by a 405' incline shaft, and tunnels of 300', 350', 200' and 450', estimated to show 1,000 tons of ore,

Equipment includes a small steam plant and 20-ton concentrator with Dodge crushers, Huntington mill and 1 Wilfley table.

SAN LUCAS COPPER CO.

MEXICO

Is controlled, through ownership of entire stock issue, by El Magistral Copper Co. (which see).

SAN LUIS; CIA. BENEFICIADORA.

MEXICO

Works office: San Luis de la Paz, Guanajuato, Mex. Owns the Ojo de Agua smelters. Idle.

SAN LUIS MINING CO.

MEXICO

Office: 15 William St., New York. Mine office: Panuco de Coronado, Durango, Mex. David F. Beggs, pres. and treas.; Col. Britton Davis, managing director; C. P. Jacobs, F. C. Hanford, W. B. Raymond, Wm. F. Read and Hollister S. Logan, directors.; Myra B. Martin, sec.

Organized 1900, under laws of West Virginia, and capitalization increased, 1905, to \$3,000,000, shares \$1 par. First dividend, 1%, was paid Jan., 1906, and a second dividend was paid July, 1906, both unearned. Direct title to this property apparently is held in the name of Lucía Mining Co. Annual meeting, last Tuesday in February.

Lands, 506 pertenencias, 1,241 acres, in 64 groups, and a 25-acre mill site, in the San Lucas and Pánuco de Coronado districts of Durango. Company also claims to hold El Cura ranch, 35,000 acres.

The mineral property shows limestone and porphyry, carrying fissure veins and contact deposits, the company reporting 64 orebodies, of which 6, under development, were estimated by the management to average 3% copper, 12% lead, 1% zinc, 35 oz. silver and \$4 gold per ton, mainly from sulphide ores. The mines were discovered A. D. 1650, and worked more or less irregularly until 1830, when closed on account of water and Indian troubles, remaining idle until reopened, 1901, by the present company.

The San Luis mine shows a considerable body of copper ore, of low average tenor, with some high-grade silver ore.

The Potosina mine, with 1,994' of workings at last accounts, is said to show, at the western end, a considerable body of ore of smelting grade and a large quantity of milling ore.

The San Gonzalo mine, 350' deep, has a vein showing mainly low-grade ores, carrying silver values above, with copper on the lower levels, and is reported also to have a 2' vein carrying 25 kgs. silver per ton, with some gold.

The Castellana mine carries a continuation of the vein of the San Gonzalo mine, next west, said to have been proven for 1,600' by trenches and pits of 10 to 60' depth, and a 120' shaft, now idle.

The Sidney has a 2' vein of galena, giving assays up to 45% lead, 4 oz. silver and 3 grams gold per metric ton, opened by a shallow shaft, but has been idle for some years on account of water.

The San Lucas mine, 19 hectares, about 35 miles N. W. of Gabriel, is an old property claimed to have nearly 2 miles of workings, carrying mainly lead and zinc ores, and presumably is idle.

The Adventura mine, adjoining the San Lucas, has a heavy gossan over a 3' vein of carbonate ore, claimed to give assays of 32% copper and 12 grams gold per metric ton, developed by an old shaft.

The San Pablo mine has parallel veins said to carry 6 to 36" paystreaks of sulphide ore, giving assays up to 16% copper, 360 oz. silver and 14 grams gold per ton. Development is by an abandoned incline shaft and a 175' vertical shaft, latter equipped with headgear and hoist.

Equipment includes steam plants, claimed to aggregate 750 h. p., with 6

hoists and 2 Ingersoll-Sergeant air compressors of 12 drills combined capacity.

Buildings are claimed to include a machine shop, carpenter shop, smithy, offices, 4 general stores and a large number of dwellings for workmen, with a total of 175 buildings.

The 60x180' mill has 2 crushers, 1 jig and 4 Bartlett tables. Concentration seems to have proven more satisfactory than leaching.

The Trinidad leaching mill, of 120 tons claimed daily capacity, has 2 calcining furnaces and apparently treated only about 40 tons of ore daily, when in operation.

Idle on account of revolutionary disturbances in Mexico. The company is one of the Treadwell-Logan-Martin promotions and its early history is described in Vol. X by the late Horace J. Stevens.

SAN LUIS POTOSI SMELTER.

MEXICO

Owned by Compañía Metalurgica Mexicana.

SAN MARTÍN y ANEXAS, S. A.; COMPAÑÍA MINERA.

MEXICO

Office: Apto. 145, Oaxaca, Mex. Mine office: San Martín de los Cansecos, Oaxaca, Mex. Frank M. Leonard, pres. and gen. mgr.; Lic. Jesús Acevedo, vice-pres.; Ranulfo Bravo, sec.-treas. and supt.; preceding officers, Frank J. Woods and Alfredo Castillo, directors. Organized Jan. 15, 1907, under laws of Mexico, capitalization 400,000 pesos, shares 10 pesos par, in 35,000 fully paid shares, and 5,000 assessable shares; issued, 37,995 shares, at last accounts.

Owns 53 pertenencias, including El Billete de Banco, King Dodo, La Liga, Las Virginias, La Maria and La Roseta mines, about 10 miles from Ocotlan. The San Martin property formerly owned was sold, 1911, for \$500,000.

Property shows diorite cut by a 6' vein, carrying silver ore assaying 5 kgs. silver and 50 grams gold per ton.

Development consists of a 160' shaft, on the Maria, an 80' shaft on the Billete de Banco and a 350' tunnel on La Liga claims.

The political disturbances in Mexico have caused a suspension of operations and the mine is now filled with water. Property considered promising and management good.

SAN MARTIN MINING CO.

MEXICO

Office: Paseo Bolivar 407, Chihuahua, Mex. Mine office: Uruáchic, Chihuahua, Mex. John J. Clague and John J. Waterson, managers, at last accounts. Lands, 68 hectares, have 4 shafts and a 1,600' tunnel developing copper, lead, zinc, silver and gold ores. Equipment includes a 50-h. p. Pelton wheel, and a concentrator with two 4' Bryan mills, 2 Bartlett tables and 3 Wilfley tables, and there is a small smelter with a 25-ton reverberatory furnace. Presumably idle.

SAN MATEO, S. A.; CIA MINERA.

MEXICO

Office and mine: Velardena, Durango, Mex. Carlos Michaud, pres.; Lloyd A. Rone, mgr. Organized 1911, as successor of the Hileta Gold & Silver Mining Co. Lands, 72 acres, including the Santo Tomas, Bolsa and other mines, and a 60-acre mill site. Property is reported to show 5 fissure veins in limestone and porphyry, having a generally E.-W. strike. One vein of 12" to 3' width is developed by a 1,600' tunnel, with 6,000' of workings, carrying ore said to average 1% copper, 6% lead, 36 oz. silver and \$10 to \$50 gold per ton. Equipment includes steam and gasoline hoists, good for 1,000' each, and a 3-drill air compressor. There are 9 buildings.

SAN PABLO; COMPAÑIA MINERA.

MEXICO

Mine office: San Pedro de las Colonias, Parras, Coahuila, Mex. Juan

Cuyas, superintendent, at last accounts. Property carries gold, silver and copper ores. Presumably idle.

SAN PEDRO COPPER CO., S. A.

MEXICO

A Mexican corporation, a subsidiary of the Greene Cananea Copper Co. H. B. Paull, vice-pres.; George Young, sec.; J. V. Montague, treas.; preceding officers, J. S. Douglas and S. P. Applewhite, directors. The entire capital stock is owned by the Greene Cananea Copper Co. This company holds title to the following mines: America, Bryan, Copper Belt, El Oriente, Las Dos Naciones, Seguro, Square, Swansea, eastern part of Massey No. 2, and owns a three-fortieths undivided interest in the Sierra de Cobre mines. (See Greene Cananea Copper Co.).

SAN ROBERTO MINING CO.

MEXICO

Office and mine: Zacatecas, Zacatecas, Mex. C. A. Bentley, general manager, at last accounts. The mine, opened to depth of 300', shows copper and lead ores, occasionally assaying up to 30% copper, with good gold and silver values. The mine has given a limited production of excellent ore. Equipment includes a malacate, for hoisting. Presumably idle.

SAN SIMON COPPER CO.

ARIZONA

Office: Marquette, Mich. Mine office: Paradise, Cochise Co., Ariz. Nathan M. Kaufman, pres.; Hon. Norman W. Haire, vice-pres.; S. R. Kaufman, sec.-treas.; preceding officers, Thos. F. Cole, John A. Duncan, Wm. G. Rice and Thos. H. Collins, directors. Organized 1907, under laws of Arizona, as a reconstruction of the Chiricahua Development Co., capitalization \$2,500,000, shares \$10 par.

Lands, 40 claims, 7 patented, about 750 acres, 16 miles from nearest railway, at Rodeo, taken over April, 1903, by predecessor of present company, and previously operated by Capt. Thos. Burns as a silver mine. The mine has a 750' crosscut tunnel with a 100' winze 700' from the portal, cutting 50' of leached ore, apparently the apex of a sulphide orebody. The 400' Mars shaft, sunk on a vein having a 150' gossan, passed through leached ore and is bottomed in chalcopyrite of 2 to 4% copper tenor. The 400' Planet shaft has drifts on the 4th level.

Equipment includes two 150-h. p. boilers, two 2,000' Lake Shore double-drum hoists, and a 16-drill Sullivan air compressor. There are several mine buildings. Idle, except for annual assessment work.

SAN TIMOTEO MINING & SMELTING CO.

MEXICO

Idle. Mine office: Uruachic, Chihuahua, Mex. T. A. Ripperdan, superintendent. Mine carries auriferous and slightly argentiferous copper ore, said to average about 50 pesos per ton in gross values. A smelter, built 1909, has a 25-ton reverberatory matting furnace.

SAN XAVIER COPPER CO.

MEXICO

Idle. Office: Tucson, Ariz. Mine office: San Xavier, Sonora, Mex. C. C. Rountree, pres.; Wm. Foster, sec., at last accounts. Organized under laws of Arizona, capitalization \$1,000,000, shares \$1 par and holds direct title to lands through the Compania Minera de Cerro Verde, S. A., organized in Mexico.

Property, 1,440 pertenencias, 3,500 acres, 80 miles east of La Colorado in the Hermosillo district, Sonora. Company also owns 300 pertenencias lying 24 miles to the southward and about 4 miles north of the Yaqui river.

SANTA ANA-ARIZONA MINING CO.

ARIZONA

Letters sent to mine office, Middlemarch, Cochise Co., Ariz., are unanswered. A. W. McPherson, pres.; Geo. H. Neale, vice-pres.; A. F. Gressler, sec.-treas.; Wm. Goar, gen. mgr., at last accounts. Organized April, 1906, under laws of Arizona, capitalization \$2,500,000, shares \$1 par.

Lands, 14 claims, unpatented, 280 acres, between the Middlemarch and

Black Diamond mines, on Dragoon mountain, in the Black Diamond district, 8 miles from the Southern Pacific railway at Pearce. The property shows limestone and porphyry, with 2 orebodies, under development, that show carbonates and chalcopryite ore, estimated by the management to average 10% copper, 15% lead and 6 oz. silver per ton, which is high. Development is by tunnels of 70' and 80', and by shafts of 56', 110' and 300'.

Equipment includes a small steam plant, with a 10-h. p. hoist, good for 500' depth, and there are 2 buildings. Idle some years.

SANTA CRUZ MINING CO.

MEXICO

Is a subsidiary of the Sonora Central Mines Co., and properties described under that title.

SANTA EDUBIJIS MINE.

MEXICO

Office: Union de Tula, Autlan, Mex. Dargin & Richardson, owners. Lands, 60 pertenencias, 7 miles S. W. of Ayutla, show a fissure vein of 5 to 10' width, in diorite, carrying argentiferous oxides and carbonates, associated with hematite. Has a 130' shaft and 325' crosscut tunnel reported to show some ore blocked out for stopping. Presumably idle.

SANTA FE CONSOLIDATED MINING CO.

MEXICO

Mine address: Yzabel, Sonora, Mex. P. J. Tehaney, president and general manager, at last accounts Organized April, 1909, under laws of Arizona, capitalization \$500,000, shares \$2.50 par.

Property consists of 238 hectares, on the Sonora river, 9 miles below Cananea, worked in 1886 by Col. Wm. C. Greene. Development includes the 350' Santa Fe shaft and 206' Montoyo shaft, showing veins with small shoots of sulphide ore assaying up to 7% copper and 300 oz. silver per ton. Equipment includes a hoist, and management was said to plan erecting a 100-ton mill.

SANTA FE; MINA.

MEXICO

Idle. Mine office: Salto de Agua, Palenque, Chiapas, Mex. This property, formerly held by the Chiapas Mining Co., Ltd., is developed by a 1,560' tunnel and a 200' main shaft, showing a mineralized zone of about 100 meters width, between diorite and limestone, apparently formed by contact metamorphism. Values are mainly in copper ore, but the ore is extremely complex, carrying cuprite, malachite, bornite, chalcopryite, tetrahedrite, chrysocolla, sphalerite, galena, and free gold, associated with pyrite, with a gangue that is mainly wollastonite. The best grade of concentrating ore is mainly bornite, disseminated in a gangue of wollastonite and garnet. Equipment includes a water-power plant, 30-stamp mill, 100-ton concentrator and 75-ton smelter. Mine was actively worked and extensively developed under former ownership, producing a gold-copper ore carrying auriferous bornite that was difficult to treat, and despite abundant capital and experienced management, property could not be made profitable.

SANTA FE COPPER & GOLD MINING CO.

MEXICO

Office: 1207 Fort Dearborn Bldg., Chicago, Ill. Is controlled through stock ownership by International Copper & Gold Co., which is itself a subsidiary of the Sonora Central Mines Co. Lands are 8 groups, in the states of Sonora and Sinaloa. Described under Sonora Central Mines Co.

SANTA FE GOLD & COPPER MINING CO.

NEW MEXICO

Office: 11 Broadway, New York. Mine office: San Pedro, N. M. E. C. Westervelt, pres.; E. J. Macnamara, sec.-treas.; preceding officers, O. B. Van Sant, Ernest W. Brown, Herman Asendorf, J. DeSmet Maguire, M. Kaufman, O. B. White and Chas. N. King, directors; Haines Gridley, supt.

Organized Jan. 25, 1899, under laws of New Jersey, capitalization \$2,500,000, shares \$10 par, as a reconstruction of the Santa Fe Copper Co. The company began business with \$500,000 cash, and had a cash balance of \$27,-

983, Jan. 1, 1912. State Street Trust Co., Boston, registrar; Old Colony Trust Co., Boston, transfer agent. Shares are listed on the Boston Stock Exchange. Annual meeting, fourth Tuesday in January.

Owens the San Pedro mine and 49,400 acres land, 3,400 acres of copper claims and 46,000 acres of miscellaneous lands, including coal areas of promise, all in the San Pedro land grant, Santa Fe county, N. M. The San Pedro mine, 21 miles from the Santa Fe railway, is opened by a single shaft, on a blanket vein of 150' average thickness, dipping at an angle of less than 15°, about half the orebody being workable, though of low average grade. Ore is chalcopyrite, with garnet and quartz gangue, and, being highly silicious, requires heavy iron and lime fluxes. Ore smelted, 1907, returned an average of 2.7% copper, 0.8 oz. silver and 75 cts. gold per ton.

Production was begun Jan. 1, 1901, and suspended Nov., 1901, after which nothing but diamond drilling was done, until the smelter was blown in Feb. 10, 1907, but again blown out Oct. 12, 1907, since which date the management reports having blocked out 100,000 tons of ore averaging better than 3% copper, which is now being stoped.

Equipment includes a steam plant, with a hoist and a 15-drill air compressor.

The mill treats second-class ore of about 2% copper tenor, making 15% concentrates, and the management formerly planned the installation of a Wetherill magnetic separator for treating low-grade ores.

The smelter, at the mine, has one 125-ton blast-furnace, burning Colorado coke, and producing matte of about 60% average copper tenor, shipped to New Jersey for conversion.

The property employs about 350 men, labor being mainly Mexican.

Production was 370,483 lbs. fine copper in 1903, and in 1907 was 21,298 tons of ore smelted, yielding 1,223,457 lbs. fine copper, 17,625 oz. silver and 786 oz. gold, secured at an average cost of about 14 cts. per lb., after deduction of included gold and silver values. The mine was idle several years following 1907, owing to the low price of copper, but operations were resumed July, 1912. During the last 6 months of 1912, production was 801,895 lbs. copper, 13,133 oz. silver and 494 oz. gold. Net profits for the period were \$15,526.

The deposit is low in grade, though possessing an immense tonnage of potential ore. Property considered promising and management good.

SANTA GERTRUDIS MINES, LTD.

MEXICO

Mine office: Villa Alta, Oaxaca, Mex. R. H. Jeffrey, general manager, at last accounts. Property includes a number of mines, among these being La Purisima, San Guillermo and Los Remedios, all carrying auriferous and argentiferous copper and lead ores. Developed by 16 tunnels and numerous shafts, 2 deepest on the San Guillermo, having 19 levels. There is a 600-ton mill.

SANTA ISABEL MINING & MILLING CO.

COLORADO

Letters unclaimed at former offices: Colorado Springs, Colo., and Creston, Saguache Co., Colo. Howard F. Browning, superintendent. The mine is mainly a silver and gold producer, securing a little copper as a by-product. Equipment includes steam power, and a 75-ton concentrator. Idle several years.

SANTA MARIA DE LA PAZ y ANEXAS, S. A.;

CIA. MIN. y BEN. de.

MEXICO

Mine office: Teapulco, Mex. Organized Aug. 20, 1913, capitalization, 15,000 pesos. Owns the Helvetia mine carrying silver-copper ores, apparently but slightly developed. No returns secured.

SANTA MARIA DE LA PAZ; NEGOC. MIN.**MEXICO**

Office: 10 Cinco de Mayo, San Luis Potosi, Mex. Mine office: Matehuala, Catorce, San Luis Potosi, Mex. Pedro Barrenechea, pres.; Edgardo Mead, sec.; W. B. A. Dingwall, gen. mgr.; J. H. Wentworth, asst. mgr.; B. G. Lott, supt. Organized under laws of Mexico, capitalization 240,000 pesos, shares 25 pesos par. From 1895 to 1904 inclusive, the mines yielded 11,327,210 pesos worth of ore, and the company paid 5,778,270 pesos dividends therefrom.

The mines which are extensively developed carry gold and silver-bearing copper and lead ores, with values mainly in silver and lead, the gold and copper being byproducts. The ores are mined to depth of 1,500'.

Equipment includes steam and electric power. The reduction plant includes a 300-ton concentrator with Blake crushers and Chilean mills, and a smelter with two 40-ton furnaces. Company employed about 1,500 men, but was closed down Nov., 1913, on account of revolution.

SANTA MARIA GOLD & COPPER MG. & REDUCTION CO.**UTAH**

Office: P. O. Box 517, Ogden, Utah. Mine office: Utah Hot Springs, Box Elder Co., Utah. Don Maguire, pres. and mgr. Organized 1907, under laws of Utah, capitalization \$500,000, shares \$1 par.

Lands, well watered and fairly timbered, are extensive, including mill and smelter sites, lying in a very rugged territory in the Sierra Madre district of the Wasatch mountains. The property carries 7 fissure veins, practically parallel, with a strong cross-fissure, and 1 contact deposit. The veins range from 12 to 70' in width, and carry ore holding chalcopyrite, associated with pyrite and occasional small amounts of galena, ore being mainly of concentrating grade. The mine is developed by the 2,000' Clara Belle tunnel, cutting 3 veins, and planned to cut 5 more, with backs of 200 to 1,800'. The mine has about a mile of workings, showing ore developed regarded as sufficient to warrant a mill.

Buildings include a power house, having an air compressor, and a smithy and boarding house.

SANTA MARIA GROUP.**NEW MEXICO**

Address: care Geo. S. Carson, Iowa City, Ia. Lands, 5 claims, patented, about 80 acres, lying between the Chino and the Hermosa properties in the Santa Rita district, Grant Co., N. M. Property, slightly developed by Cyclone core shot-drill work, shows low-grade ore. Idle several years.

SANTA MARIA MEXICO MINING ASSOCIATION.**MEXICO**

Idle. Office: Merrill Bldg., Milwaukee, Wis. Mine near Parral, Chihuahua, Mex. Wm. G. Gruber, pres. and gen. mgr.; Arthur H. Gruber, sec. and treas., at last accounts. Organized under laws of Wisconsin, capitalization \$250,000, shares \$1 par.

Lands, 50 claims, in 3 groups, known as La Lolita, La Viola and Santa Clara, in the Galeana district of the San Blas mountains of the Sierra Madre, midway between and 25 miles from the Mexican Central and Sierra Madre Pacifico railways. Principal development is on La Lolita group, which has shafts of 75' and 150', showing oxidized ores, shipments from which are said to have averaged 15% copper.

SANTA RITA; COMPANIA MINERA.**MEXICO**

Mine office: Santa Barbara, Chihuahua, Mex. Alberto Terrazas, pres.; Miguel Horcasitas, mgr., at last accounts. Property is the Santa Rita mine, in the Sierra Chorreros, showing ore with values mainly in copper. Idle.

SANTA RITA COPPER MINING & SMELTING CO.**ARIZONA**

Office: care C. F. Elliott, P. O. Box 592, El Paso, Tex. Mine office: Arivaca, Pima Co., Ariz. Organized June, 1901, under laws of Arizona, capitalization \$3,000,000, shares \$1 par; issued, \$2,750,000.

Lands, 12 claims, unpatented, 220 acres, in the Tyndall district of the Santa Rita mountains, 13 miles from Arivaca.

The property shows granite, porphyry and diorite, carrying several veins of sulphide ore, usually at the contact of the diorite and granite. Veins range from 4 to 12' in width.

The mine has 2 shafts and several tunnels, with a total of about 2,000' of workings, mostly in low-grade ore. A new tunnel, planned to give a back of 110', was 200' long, July, 1913. The mine is without power equipment.

SANTA ROSA MINE.

MEXICO

Mine address: Fronteras, Sonora, Mex. Jas. H. Kirk, owner. Lands, 126 hectares, $3\frac{1}{2}$ miles from the Nacozari railroad, in the Cabullona mountains, in a very arid section.

Property shows several veins said to lie between porphyry and limestone, and reported to give assays up to 37% copper, 35% lead and 20 oz. silver per ton. Orebodies are isolated, small and mostly low in grade.

Development is by 5 short tunnels and 5 shafts, No. 1 being 350', and No. 3 being 300' deep, showing pockets of ore in leached iron, with a 50' orebody on the 200' level. Equipment includes a good machinery plant, with a 50-h. p. engine, and about a dozen mine buildings. Former owners shipped a little ore to the Douglas smelter. The property is under lease to J. E. Englent, of Sonora. Property has been examined by S. M. Greenidge, of Douglas, Ariz.

SANTA ROSA MINING CO., LTD.

MEXICO

Is a subsidiary of the Exploration Co. of England & Mexico, Ltd., itself owned by the Exploration Co., Ltd.

SANTA ROSA MINING & MILLING CO.

MEXICO

Letters unclaimed at former offices, Marion, Ohio, and Ayutla, Jalisco, Mex. Lands are the Chinos group, near the village of Santa Rosalia, carrying argentiferous and slightly auriferous copper ore, developed by a cross-cut tunnel showing considerable ore said to assay \$20 to \$60 per ton.

Equipment includes steam power, an old 10-stamp mill and a new 100-ton concentrator, built 1910, latter having a No. 5 Huntington mill, 4 Overstrom tables, 2 Woodbury tables, 2 Richards classifiers and 2 Callow settling tanks. Probably idle during revolution.

SANTA TERESA MINING CO., S. A.

MEXICO

Is the Mexican incorporation of Sonora Consolidated Mining Co.

SANTIAGO CONS. MINING, MILLING & TUNNEL CO. COLORADO

Mine office: Georgetown, Clear Creek Co., Colo. Wm. Rogers, mgr.; D. H. Burlingame, supt. Mine has a 5,000' tunnel showing gold and silver-bearing copper ores. Early in 1913, company was mining a 2' streak of cerrusite ore. Equipment includes steam power and a 50-ton concentrator.

SANTIAGO MINING CO.

MEXICO

Letters unclaimed at former office: St. Joseph, Mo. Mine near Parral, Chihuahua, Mex. Geo. J. Greene, pres.; Geo. Roche, vice-pres.; T. G. Travis, sec.-treas.; Nat P. Wilson, gen. mgr.; at last accounts. Organized 1907, under laws of Arizona, capitalization \$1,000,000, shares \$1 par.

Lands, 6 claims, 79 acres, near Parral, and 1 claim in Otero county, N. M. The Chihuahua property shows limestone and porphyry, carrying several fissure veins of 12' average width, giving average assays of 3.5% copper, 15% lead, 22 to 25 oz. silver and \$6 gold per ton, from oxide and sulphide ores. The mine has 7 shafts of 55 to 150' depth, with total of 755' of workings.

Equipment includes a 250-h. p. electric plant, with 3 hoists, good for

1,000' each, a 7-drill air compressor, machine shop and other mine buildings. Idle several years.

SANTIAGO MINING CO.**MEXICO**

Mine office: Zacatecas, Mex. Jas. H. Davis, manager, at last accounts. Property is a small copper-gold-silver mine near Zacatecas, developed by a 300' shaft, equipped with a small steam plant. Presumably idle.

SAPPHIRE GOLD & COPPER CO.**ARIZONA**

Office: Swansea, Yuma Co., Ariz. H. A. deRudio, pres. and gen. mgr.; Chas. B. Croner, sec. Organized Sept. 30, 1911, under laws of Arizona, capitalization \$1,000,000, shares \$2 par, nonassessable. Debentures, \$200,000 authorized, but not issued, at last reports.

Lands, 5 claims, unpatented, in the Owens district, Mohave county, 12 miles from a railway. The property carries a contact vein between quartzite and porphyry, said to be 8' wide, traceable for 800' and to show a 4' streak of high-grade gold-copper ore. Development consists of 2 short tunnels. Property is without power equipment.

SARATOGA MINING CO.**COLORADO**

Office: Union Trust Bldg., Detroit, Mich. Mine office: Idaho Springs, Clear Creek Co., Colo. F. L. Colby, pres.; Chas. R. Dunn, sec.; E. W. Pendleton, treas.; preceding officers, F. W. Blair, Edwin Dodge and E. Van Cise, directors. John Owen, gen. mgr. Organized Nov. 18, 1911, under laws of Colorado, as the successor of the Clear Creek Mining & Reduction Co., capitalization \$300,000, shares \$10 par, nonassessable; issued, 20,024 shares.

Property is the Saratoga-Gaston group, and the Cyclops claim, at Russell Gulch, opened through the Newhouse tunnel. Equipment includes steam power. The smelter, at Golden, has been disposed of.

SASCO SMELTER.**ARIZONA**

See Imperial Copper Co.

SAVAGE COPPER CO.**WYOMING**

Office: Lincoln, Neb. Mine address: Encampment, Wyo. Owns 3 claims, under lease and option to purchase to C. E. Winter and C. L. Martin, adjoining the Hidden Fortune group, above the Doane-Rambler mine. The property, developed by several shallow shafts, shows a wide vein of low-grade ore.

SAVAGE GOLD & COPPER CO.**ARIZONA**

Letters unclaimed at former offices, Chicago, Ill.; Douglas, Ariz., and Paradise, Cochise Co., Ariz. F. M. Wajtalewicz, pres.; J. A. Lewandowski, vice-pres.; P. Dryzmaliski, sec., at last accounts. Organized Jan. 6, 1904, under laws of Arizona, capitalization \$3,000,000 shares \$1 par.

Lands, 53 claims, about 1,000 acres, in the California district, lying in the eastern foothills of the Chiricahua mountains, 10 miles from Rodeo, the nearest rail station. Patents were applied for and adverses filed, 1909. The property shows 5 lenticular orebodies, of which 4, under development, are of 2 to 36' width, giving assays of 5% copper, 1% lead and from nothing to 30 oz. silver per ton, lead values being from occasional bunches of galena.

Development is by 5 shallow shafts, to depth of 300', the 710' Snowball incline shaft showing an orebody ranging up to 23' in width. There also is a 350' tunnel with about 3,000' of workings.

Equipment includes a 60-h. p. Otto gasoline engine and a 75-kw. electric generator, 2 motors, electric hoist and electric drills.

Idle since Aug., 1909, and is not regarded favorably.

SAVAGE GOLD & COPPER MINE CO. COLORADO & NEW MEXICO

Office: 315 Exchange National Bank, Colorado Springs, Colo. Mine at Santa Rita, Grant Co., N. M. J. R. McKinney, pres.; M. W. Savage, vice-

pres.; L. L. Aitken, sec.-treas.; preceding officers, J. L. Lindsey and E. C. Sharer, directors. Organized 1899, under laws of Colorado, capitalization \$1,500,000, shares \$1 par. Company owns a 50% interest in the Battle Lake Exploration Co., at Encampment, Carbon Co., Wyo., and a 20% interest in the Arizona Copper & Gold Mining Co., having 5 claims near Salome, Yuma Co., Ariz.

The New Mexican holdings are said to comprise 7 claims, 105 acres, near the Chino mine, but idle, apparently for several years.

The Colorado claims, 12 acres, form the Gold King or International Gold King mine, on Gold hill, near Cripple Creek, Teller Co., Colo., showing veins developed by a 520' main shaft.

SAVANNA COPPER CO.

NEW MEXICO

Address: Henry Hovland, Lonsdale Bldg., Duluth, Minn. Operating office: Silver City, N. M. Mine and works office: Silver City, Grant Co., N. M. David L. Fairchild, pres.; Geo. J. Lonstorf, vice-pres.; Harvey P. Smith, sec.; Lucien Merritt, treas.; preceding officers, Carl Landsee, Walter A. Barrows, Jr., C. W. Moody, Thos. A. Merritt and J. E. Rothaus, directors, I. J. Stauber, supt. Organized Sept. 16, 1908, under laws of Arizona, capitalization \$2,000,000, shares \$10 par, half in full-paid and half in part paid stock, latter \$5 paid. The company was a merger of the Copper Gulf Mining Co. and Comanche Mining & Smelting Co., and also absorbed the Casa Grande Development Co., owning in fee simple all property formerly owned by the Comanche Mining & Smelting Co. and holding all but 320 shares, or 99.36%, of the stock issue of the Copper Gulf Mining Co. In Jan., 1913, the company had 133,116 shares of full-paid stock outstanding. Cash balance, Feb. 1, 1913, was \$12,628.

The Copper Gulf Mining Co. owns its property in fee and owes the Savanna Co. \$124,464 for money borrowed to develop its claims. The combined properties consist of 199 claims, about 4,000 acres, all in Grant county, N. M., but in 5 districts. The Burro Mountain group of 149 claims, 86 patented, is in the district of that name. The company has 28 claims, 16 patented, in the Pinos Altos district, 4 patented claims in the Anderson district, 17 unpatented claims in Chloride Flat district and 1 patented claim in the White Signal district.

The claims in the Burro Mountain group constitute the principal and most valuable holdings. They are 12 miles from Silver City, less than that from Whitewater on the railroad, and close to the New Whitewater branch of the A. T. & Santa Fe R. R., now being built. The Burro Mountain properties lie south of the Phelps-Dodge properties, formerly owned by the Burro Mountain Copper Co. and the Chemung Copper Co.

The Burro Mountain group of 149 claims has an area of 2,577 acres, including about 1,000 acres of iron-ore lands, known as the Iron Mountain mine, held for fluxes, about 1 mile west of Silver City, with ranch and orchard lands, and springs having an estimated flow of 400,000 gal. daily. The Comanche group comprised 43 claims. The Copper Gulf group consisted of 1,440 acres.

The lands now held by the Savanna comprise many different groups, held at various times in the past by many different companies, including former holdings of the Copper Gulf Development Co., Comanche Mining & Smelting Co., Alessandro Copper Mining Co., Virginia Copper Mining & Smelting Co. and Leopold-Tyrone Copper Co.

The Jennie group of 4 claims, patented 1910, on the Gila river, 35 miles N. W. of Silver City, is not worked owing to its inaccessibility, and development on the Chloride Flat property has been confined to assessment work.

The Burro Mountain group show a central stock of granite-porphry, surrounded by granite and coarse-grained porphry, with no sedimentaries in the district, save a recent conglomerate forming small patches on the crests of the hills. The mineralized zone, 2 by 3 miles long, shows numerous strong and well-defined fissure veins in altered monzonite and quartz-porphry. Both these cross veins and entire sheets of intrusive porphry carry disseminated copper and iron sulphides, the fissures also having both chalcocite and chalcopyrite, associated with pyrite, little silver and practically no gold, the ore ranging 2 to 10% in copper, with an average of 3%. The upper workings of this group show oxide, carbonate and silicate ores. The group as a whole has 8 principal shafts of about 300' average depth, with 4 miles of workings, developing sulphide ore of 3 to 4% estimated average copper tenor.

The Virginia mine, having a 300' shaft, is an old property that shipped for several months in 1907 about 3 carloads of ore weekly to the Calumet & Arizona smelter said to have averaged \$23.25 per ton in value. This mine is said to have 100,000 tons of ore developed on the 100' level.

The Gettysburg mine has a 350' shaft, from the bottom of which a crosscut was run to the Fairhaven mine. Drilling on the Gettysburg apparently has not given very encouraging results.

The Fairhaven mine is developed by the Fairhaven tunnel, which crosscuts the great Sampson dike, on which the big orebody of the Burro Mountain Copper Co. is located, the tunnel cutting this orebody about 100' from its portal.

The Boone, Oquawka and Klondike shafts of the Comanche group have about 6,449' of workings. These 3 mines have shafts of about 300' depth each, and ore has been developed for about 700' in length by drifts and drill borings, latter, near the Oquawka shaft, encountering 15' of sulphides averaging 3.4% copper. The Copper Gulf mine also has a 300' shaft. "B" shaft, sunk near the Fairhaven tunnel, is 300' deep, with about 100' of drifts on the 300' level showing no commercial ore, but churn-drill borings in the vicinity have exposed a large amount of low-grade material, a small part of which is commercial ore. It is planned investigating this deposit by drifts from the shaft. In 1910, forty churn-drill holes were bored to an average depth of 440', aggregating 18,806', put down at an average cost of \$1.89 per foot.

The Savanna did considerable drilling along the boundary with the Burro Mountain Copper Co., at the joint expense of both companies, this work resulting in a rather indifferent showing on the Virginia-Copper Gulf-Colwell groups, but several holes on the Copper King group showed sulphide ore of 5.25% average copper tenor, with indications of the existence of a large body of ore, apparently improving in tenor toward the north and east, in which direction later holes have been bored, but holes at this point are much deeper than were drilled previously, being put down for 700 to 950' in depth, requiring 4 to 6 weeks per hole to drill. The holes on the Copper King claim, adjoining the Chemung mine, offer strong encouragement for the development of a large and valuable body of ore. Borings on the Faulkner claim show ore assaying 3 to 10% copper, and No. 39 drill hole, on the Altos claim, gave cores assaying 5.25% copper at depth of 135', and chalcocite averaging about 1.5% copper at depth of 200', with commercial ore from 625 to 745' depth.

The Pinos Altos group has 30 contiguous claims at Pinos Altos, about 9 miles N. E. of Silver City. The claims show fissure veins carrying complex sulphide ores. The group has 4 shafts of 400 to 900' depth, with about 30,000' of workings. The property was a considerable producer for years under the ownership of the late Senator Hearst and has large bodies of copper

and zinc sulphides, carrying up to 3% copper, and 10 to 20% zinc, with \$8 to \$20 combined gold and silver values per ton. The principal workings are the Gillette shaft sunk on Pacific No. 1 claim, and the Hearst shaft on Pacific No. 2 claim.

The Pinos Altos water supply is somewhat inadequate and a pumping plant was installed 1910, in the Michigan shaft, to furnish water for drilling and camp use. A new pumping plant was also installed at drill hole No. 21, which developed considerable water. A private railway line connects this mine with the reduction works at Silver City.

The Silver City reduction works comprise 2 mills, one being a 50-ton concentrator and leaching plant of small present importance. The new concentrator, 1,500' west of the smelter, is of about 200 tons daily capacity, equipped with crushers, 4 Huntington mills, rolls, jigs, elevators and 12 Wilfley tables, and, with minor alterations, could be brought to a daily capacity of about 300 tons. This mill also has a magnetic separation process plant for the treatment of zincy ores.

The smelter on the Silver City branch of the Santa Fe railway, has large ore bins. There are 200-ton and 300-ton water-jacket blast furnaces, 1 calciner, and 1 reverberatory furnace, and the works have a briquetting plant and a converter department. Slag losses were said to have been only 0.39% copper when the smelter was operated by the Comanche Co.

The reduction plant includes a powerhouse, boiler house, machine shop, carpenter shop, office and a number of dwellings for employees.

Mining on a commercial scale was begun early 1913. Property considered promising and management good.

SCANLAND MINE.

ARIZONA

Office and mine: Paradise, Cochise Co., Ariz. F. S. Douglas, gen. mgr.; L. H. Scanland, owner and mine supt. Lands, 12 claims, unpatented, 240 acres, also a 10-acre mill site, in the California district, show limestone, quartzite and porphyry, with 4 orebodies of 4 to 30' width, of which 1, under development, traceable about 4,500', carries oxide and carbonate ore, changing downward to ore containing chalcopryrite, galena and sphalerite. The output is estimated to average 5% copper, 20% lead and 23% zinc, with a trace of gold. Development is by a 175' shaft and 470' tunnel, with about 700' of workings. Idle several years, except for annual assessment work.

SCOTT HILL MINING CO.

UTAH

Idle. Letter unclaimed at former office and mine, Park City, Summit Co., Utah. W. D. Lewis, pres.; S. L. Raddon, sec.-treas.; at last accounts. Organized May, 1909, under laws of Utah, as a reconstruction of the Copper Apex Mining Co., capitalization \$100,000, shares 10 cts. par, assessable.

Lands, 10 claims, 7 patented, on Scott hill, between the Big Cottonwood and Uintah districts, carry lead and copper ores. Development consists of an 800' tunnel, and a shallow shaft, showing medium-grade silver-copper ore. Equipment includes a steam hoist.

SEABOARD COPPER CO.

VIRGINIA

Idle. Office: 77 South Market St., Boston, Mass. Mine office: Virgilina, Halifax Co., Va. Geo. R. Leghorn, pres.; Edward L. Pond, sec., at last accounts. Organized July, 1902, under laws of New Jersey, capitalization \$300,000, shares \$1 par.

Property, the Dorothy and Bailey mines, 135 acres, in the Virgilina district, 3 miles from the Southern railroad, shows an 8' fissure vein in schist, carrying bornite ore, estimated to average 3 to 4% copper, with combined gold and silver values of \$1 to \$1.20 per ton. Development is by shafts of 30', 265' and 115', and by 2 tunnels, of 165' each, with a total of 840' of underground workings. The ore occurs in well-defined shoots but the proportion

of shipping ore is small and the recovery in milling is low. Is not considered likely to be profitably worked.

Equipment includes a 275-h. p. steam plant, with a 25-h. p. Lidgerwood hoist, good for 500' depth, and a 5-drill Ingersoll-Sergeant air compressor. There is a 100-ton mill, and buildings include an engine house, bunkhouse and office. Company inactive since 1904, but still alive.

SEARCHLIGHT COPPER-GOLD MINING CO.

NEVADA

Idle. Office: 512 Stimson Blk., Los Angeles, Cal. Mine office: Searchlight, Lincoln Co., Nev. Samuel T. Graham, pres.; J. W. Cornick, vice-pres.; G. A. Brewer, sec.-treas. and gen. mgr., at last accounts. Organized Nov. 27, 1901, under laws of Arizona, capitalization \$1,000,000, shares \$1 par; nonassessable.

Property, 7 claims, 140 acres, reported to carry 3 fissure veins in granite with 1, under development, of 4' average width, traceable 4,500', carrying copper carbonates and chalcocite. Development consists of the 100' Oom Paul shaft and tunnels of 20', 65' and 100'. The property has no equipment or buildings.

SEATTLE-ALASKA COPPER CO.

ALASKA

Office: 638 New York Blk., Seattle, Wash. Mine office: Latouche, Latouche island, Alaska. E. Sparks, pres.; Geo. W. Terwilliger, vice-pres.; Geo. J. Hodge, sec.; Jos. Bjorn, treas. and O. B. Hess, directors. Organized under laws of Washington, capitalization \$1,000,000, shares \$1 par, nonassessable.

Lands, 35 claims, about 700 acres, near Montgomery bay, in the southern and central part of Latouche island. Claims are in 2 groups, 1 of 10 claims on tide water, with another of 25 claims about a mile from the harbor, latter being said to carry the extension of the Beatson-Bonanza vein.

Development is by a 287' tunnel, on the Delta claim, showing a vein of 4 to 6' width, yielding ore which, when sorted, assays 11 to 22% copper. The Santa Clara No. 1 claim has a 101' shaft, with an 85' crosscut, showing 2 veins, 1 of 4' width.

Equipment includes steam power, and there is a mill operated by water power, having five 1,000-lb. stamps, with room for additional stamps, 2 Card tables, and 1 slime table.

SEATTLE CASCADE MINING CO.

WASHINGTON

Office: Seattle, Wash. Mine office: Berlin, King Co., Wash. F. G. Winquist, manager, at last accounts. Lands, 6 claims, about 1 mile north of the Una mine, on Miller river, 4 miles from Berlin. Claims carry a 4 to 5' vein showing galena and chalcopryite, ore with values in silver, lead, copper and gold in the order named, developed by a 400' tunnel having a back of 275'. Equipment includes water power, an air compressor, and a small concentrator.

SEATTLE CONTACT MINING CO.

NEVADA

Mine office: Contact, Elko Co., Nev. V. A. Marshall, pres.; J. V. Marshall, supt. Property, the Delano group of 48 claims developed by a 100' shaft and 300' tunnel, with several prospect tunnels. A 3' streak of ore, cut in the main tunnel, 30' from the portal, gave assays of 25% copper, 0.5 oz. silver and \$5 gold per ton. There also is a parallel vein of 16' estimated width, said to average 5% copper. Company was shipping to Salt Lake City, at the rate of 2 carloads weekly, early 1913.

SEATTLE COPPER & ASBESTOS CO.

WASHINGTON

Office: 531 People Bank Bldg., Seattle, Wash. Mine near Leavenworth, Chelan Co., Wash. Edwin R. Peterson, president and general manager, at last accounts. Organized 1906, under laws of Washington, capitalization \$2,000,000, shares \$1 par, nonassessable.

Lands are reported by the company as 27 claims and 2 mill sites, including 7 claims known as the Chrisolite group, on Mt. Stewart. The copper group of 6 claims, 3 miles from the Aurora Mining Co., is claimed to have 2 veins, 1, of 3' width, between granite and schist, traceable 6,000', carrying melanconite, chalcocite and chalcopryite ore, estimated by the company to average 20% copper, 6 to 29% lead and 10 to 20% zinc, which figures represent selected samples only. The company also owns asbestos claims. Idle several years.

SEATTLE COPPER MINING CO.

MEXICO

Mine address: Turkey Track Ranch, via. Naco, Ariz. D. W. Davies, incorporator. The property, 8 miles S. E. of Naco, in Sonora, Mex., leased of Tom Ewing, shows a soft silicious formation carrying streaks and bunches of malachite and chalcocite ore with about 10% copper.

SECTION TWELVE EXPLORATION CO.

MICHIGAN

Office: Hancock, Mich. Mine near Houghton, Mich. B. H. T. Burritt, agent; Jas. P. Edwards, engr. Is a private syndicate, capitalization \$20,000, shares \$2 par, convertible into shares at subscription price, in case of the organization of a mining company to succeed the present syndicate.

Lands, 480 acres, held under options, lying N. E. of the Superior and next east of the Isle Royale, including the Lynch farm, lands being in Sec. 12, T. 54 N., R. 34 W. and Secs. 6 and 7, T. 54 N., R. 33 W. The property has been tested by 2 trenches and 6 diamond-drill holes, all showing more or less copper. An amygdaloidal bed, thought to be the northern extension of the Baltic, has been cut by trenches and cores taken at depth by diamond-drill borings all show copper in promising quantities. At surface the bed carries calcite and quartz, stained with copper carbonates from weathering, with some native copper and a heavy conglomerate bed, 60 to 150' in the footwall, that outcrops prominently, conforming to the conglomerate in the foot of the bed at the Baltic mine. Idle since 1910, awaiting an active market for undeveloped Michigan copper properties. Is considered promising.

SECURITY COPPER CO.

WASHINGTON

Mine office: Chewelah, Stevens Co., Wash. H. A. Sprague, pres.; D. T. Alexander, vice-pres.; L. D. Geeslin, treas.; A. H. Syverson, sec.; L. K. Armstrong, gen. mgr.; Jack Gilfallen, supt. Organized 1913, capitalization \$1,000,000.

Lands, 3 claims, 60 acres, purchased for \$30,000, include the Matterhorn group, adjoining the Standard-Chewelah, and the June-Echo mines. Claims cover a section of the "main lead" of the camp, developed on the property by 2 tunnels cutting ore. Company is planning sinking a vertical shaft with extensive underground development work in 1914.

SEDALIA COPPER CO.

COLORADO

Mine at Salida, Chaffee Co., Colo. Property was under lease to the Salida Copper Co., at last accounts.

SELBY SMELTING & LEAD CO.

CALIFORNIA

Office: Merchants Exchange Bldg., San Francisco, Cal. Works office; Selby, Contra Costa Co., Cal. H. B. Underhill, Jr., pres.; Eugene B. Braden, vice-pres.; Chas. J. Durbrow, sec.; E. N. Englehardt, supt. Organized 1875, under laws of Nevada and is controlled, through stock ownership, by American Smelters Securities Co., a subsidiary corporation of the American Smelting & Refining Co. The works represent an investment of about \$4,000,000.

The smelter, at Vallejo Junction, near Carquinez Strait, receives ore by rail and water, from all of the Pacific states, but principally from Nevada. The works include a 400-ton smelter having lead stacks, a 200-ton lead re-

verberatory, a refinery for parting gold and silver, and a plant for the manufacture of bluestone. Equipment includes steam, electric and air power. Some trouble has been had with the agricultural interests, over alleged damages from fumes, and an injunction was secured 1907, by the authorities of Solano county, but the works were not closed, and it is probable that much of the fume damage claimed was mythical. The plant includes a bag house, and also a special chamber having the Cottrell process for precipitating solids from fumes, used in connection with the parting room of the gold and silver refinery.

The Selby is perhaps the largest smelter producer of gold in the United States, or possibly in the world.

SEMINOLE COPPER CO.

UTAH

Office: 208 Brooks Arcade, Salt Lake City, Utah. Mine office: Callao, Juab Co., Utah. Clyde H. Wilson, pres.; F. L. Wilson, sec.-treas. Organized 1907, under laws of Utah, capitalization \$125,000, shares 25 cts. par.

Lands, 12 claims, adjoining property of the Wilson Consolidated and holdings of the Lucy L. Mining & Milling Co. The property in addition to veins carrying free gold, has a contact deposit between limestone and monzonite-porphyry, carrying auriferous and argentiferous copper and lead ores, with some surface ores assaying up to 30% in copper tenor. The property is also said to show lead, tin and nickel. Development is by shaft. No returns secured.

SENECA MINING CO.

MICHIGAN

Office: 12 Ashburton Place, Boston, Mass. Operating office: Calumet, Mich. Mine near Mohawk, Mich. Rodolphe L. Agassiz, pres.; Geo. A. Flagg, sec.-treas.; Jas. MacNaughton, gen. mgr.; preceding officers, Francis L. Higginson and Thos. L. Chadbourne, directors; S. Russell Smith, supt. Organized March 23, 1860, under laws of Michigan, capitalization \$500,000, shares \$25 par, fully issued, \$10 paid. Is controlled, through ownership of 11,207 shares, by the Calumet & Hecla Mining Co. The company had a debit balance, Jan. 1, 1913, of \$142,318. American Trust Co., Boston, registrar; State Street Trust Co., Boston, transfer agent. Annual meeting, fourth Monday in March.

Property, 1,880 acres, just north of the Mohawk and Ahmeek mines, is a swampy tract, somewhat irregular in outline and is heavily covered with drift. The property carries the Calumet, Keweenaw and Allouez conglomerates and the Osceola, Kearsarge and other amygdaloidal beds, this statement being based mainly upon the outcrop of the Kearsarge lode seen in the northeastern corner and extending for $1\frac{3}{4}$ miles across this property. The mine is on the Keweenaw Central railway.

The property was diamond drilled, 1907-08, giving some good cores from the Kearsarge amygdaloidal bed and was followed by the sinking of a single 3-compartment shaft, known as No. 1, located about 3,000' north of No. 1 shaft of the Gratiot mine. The collar is concreted through 14' of overburden, with an anchorage of 44' in the rock, and is watertight against seepage. The shaft is sunk in the footwall, being 60' from the Kearsarge bed on the 1st level, 250' on the 3rd level, and 220' on the 5th level. The shaft is 957' deep, with 5 levels, spaced about 200' apart to the 3rd level, below which they are opened at 175' intervals. Development show little or no copper values above the 4th level, but the bed has been opened by crosscuts and drifts on several levels, with about 2,000' of laterals. On the 5th level the Kearsarge bed is about 15' wide and for a distance of 150' carries a 4' pay-streak having fair copper values. No. 1 shaft has a large temporary frame shaft rock house, with an 18x24" crusher.

There is room on the tract for a second shaft on the outcrop of the

Kearsarge bed, but this lode must be reached by vertical or sharply inclined shafts on the balance of the property as the lode outcrops outside the holdings, though the underlay extends under the entire tract.

Equipment includes a small power house, having a Lake Shore duplex hoist raising $2\frac{1}{2}$ -ton skips, good for depth of 2,000', a 15-drill air compressor and 2 locomotive firebox boilers. Buildings include a boarding house and bunk house. Operations were suspended April, 1911. Property considered promising.

SENER-DUPEE DEVELOPMENT CO.

MICHIGAN

Office: care Thos. Hoatson, Calumet, Mich. Organized Dec., 1910, but not incorporated, being a private syndicate. Lands, 1,520 acres, held under long term options, 2 to 3 miles south of the Delaware mine and N. E. of Gratiot lake, near the eastern standstone, in about the center of Keweenaw county, and carrying about 2 miles of the strike of the Keweenaw formation. Lands are the S. $\frac{1}{2}$ of Sec. 26; S. $\frac{1}{2}$ of Sec. 27; N. $\frac{1}{2}$ of Sec. 34; N. $\frac{1}{2}$ of Sec. 35; S. E. $\frac{1}{4}$ of Sec. 34; E. $\frac{1}{2}$ of N. W. $\frac{1}{4}$ Sec. 33, T. 58 N., R. 30 W. Diamond drilling was begun Dec., 1910, and suspended Oct., 1911, resulting in the disclosure of 27 lodes, without, however, finding any deposits of commercial ore. Total footage drilled was 6,585'.

SEOUL MINING CO.

KOREA

Office: 418 First National Bank Bldg., Denver, Colo. Mine office: Hol-Kol, Hwang-Hai, Korea. Organized April 27, 1908, under laws of Connecticut. See company of same title in Part III.

SEVEN DEVILS COPPER CO.

IDAHO

Office: Huntingdon, Pa. Mine office: Landore, Adams Co., Idaho. Wm. K. MacNamara, pres.; Chas. F. Riddle, vice-pres.; Chas. H. McColloch, sec.; Fred D. Smith, gen. mgr.; preceding officers, M. J. Brundage, and Jas. A. Howard, directors; Geo. A. Jones, supt. Organized March 31, 1908, under laws of Arizona, capitalization \$2,000,000, shares \$1 par, nonassessable; issued, \$1,558,993. Debentures, \$20,000 at 6%. Annual meeting, second Tuesday in March.

Lands, 15 claims, partly patented, 175 acres, including the Arkansas, Decorah and Margaret mines, 16 miles from a railway. The property shows contact deposits, between diorite and limestone, having a strike of N. 75° W., and said to be 15 to 50' in width. These deposits carry oxidized ores, succeeded at a little depth, by sulphides, the chalcopryite and bornite ores said to average 5% copper, 2 oz. silver and \$1 gold per ton. Development is exclusively by tunnels, there being drift tunnels of 900' and 150', and a 483' crosscut tunnel, with 2,700' of workings, estimated by the management to show 156,600 tons of ore blocked out for stoping. The Arkansas mine has produced a little high-grade ore in the past.

Equipment includes a 125-h. p. electric plant, taking power from the Oxbow station of the Oregon-Idaho Power Co., and there is a sawmill near the mine.

SHAFTER MINING CO.

COLORADO

Office: 1 Broadway, New York. Mine office: Idaho Springs, Clear Creek Co., Colo. Thos. Peyton, pres.; M. S. Peyton, vice-pres.; Chas. D. Ross, sec.-treas.; Arthur H. Roller, gen. mgr., at last accounts. Organized 1880, under laws of New York, capitalization \$100,000, shares \$100 par.

Lands carry copper ores with values mainly in gold. Development is by an 800' shaft and a 5,500' tunnel. Has steam and electric power.

SHAMROCK MINE.

CALIFORNIA

Address: P. O. Box 117, Placerville, Cal. Mine office: Greenwood, El Dorado Co., Cal. Lle. H. Wilkins, owner and manager. Lands, 28 claims,

560 acres, in Sec. 26, and 12 claims, patented, 150 acres, in Sec. 24, T. 13 N., R. 9 E. Property, well watered and timbered, 3 miles from Greenwood, in the Foothill copper belt, carries about 4,500' of the strike of a copper ore-zone, having a hematite foot and porphyry hanging. Development is by the 80' Lipton tunnel, showing an orebody of 2 to 4' width, giving assays up to 4% copper, 12 oz. silver and \$10 gold per ton, and the 180' Dundee drift tunnel, breasted in a vein of about 4' width carrying a 2' pay-streak showing good values in copper, gold and silver.

SHAMROCK MINING CO.

ARIZONA

Mine office: Vicksburg, Yuma Co., Ariz. Robt. McEntee, pres.; Lawrence McEntee, vice-pres. Lands, 8 miles N. W. of Vicksburg, in the Plo-mosa district, carry silver-copper ore with good assay values. Developed by a 125' shaft. Property was under bond and lease to D. G. Lorenzo, at last accounts.

SHAMROCK MINING CO.

UTAH

Mine office: Marysville, Piute Co., Utah. W. J. Wostenholm, manager. Lands, in Buillion canyon, have a 3' vein, developed by 2 tunnels, No. 1 showing ore assaying up to 8% copper, 60 oz. silver and \$12 gold per ton, and No. 2 showing ore giving assays of 8% copper, 18 oz. silver and \$108 gold per ton. A few carloads of rich ore was shipped, 1910. Presumably idle.

SHAMROCK MINING & MILLING CO.

NEW MEXICO

L. D. Harrigan, pres., Newark, N. J.; Geo. A. Kalar, supt., Steeple Rock, Grant Co., N. M. Property, the Shamrock mine, shows gold-bearing copper ore, developed by tunnel work. Has steam plant and railroad spur at mine. Was shipping ore in 1910.

SHANNON COPPER CO.

ARIZONA

Office: 67 Milk St., Boston, Mass. Mine office: Metcalf, Greenlee Co., Ariz. Works office: Clifton, Ariz. Nathan L. Amster, pres.; Alex. B. Clough, vice-pres.; Col. Chas. Hayden, Berthold Hochschild, Kenneth Mc-Neil, Wm. A. Paine, Jas. Virdin, R. T. McKeever and David A. Ellis, di-rectors; Chas. R. Jeffers, sec.-treas.; J. W. Bennie, gen. mgr.; K. D. Brown, gen. supt.; H. A. Collin, mine supt.; Wm. H. Bond, mill supt.; H. H. Dyer, cons. engr.

Organized Nov. 13, 1899, under laws of Delaware, capitalization \$3,000,-000, shares \$10 par, increased July, 1909, to \$3,300,000; issued, \$3,000,000, with \$300,000 held in the treasury. Debentures, \$600,000 at 7% were retired 1911, but the company has guaranteed an issue of \$600,000 of 6% bonds, autho-rized May, 1909, by the Shannon-Arizona Railway Co., reduced by purchase to about \$350,000. The company has paid 5 dividends, aggregating \$750,000, to end of 1913. Shares are listed on the Boston Stock Exchange. National Shawmut Bank, Boston, registrar; Boston Safe Deposit & Trust Co., trans-fer agent. Annual meeting, third Wednesday in March.

Controls the Coronado Mining Co., through ownership of 53% of the stock issue and operates, under lease, the property of the Leonard Copper Co., owning the Copper Belle mine at Gleeson, Cochise county, Ariz.

Consolidated balance sheet of the Shannon Copper Co. and the Shan-non-Arizona Ry., as of March 31, 1912, shows: Assets—Mines, equipment, etc., \$3,844,452; investments in other properties, \$345,966; railroad and equip-ment, \$713,474; cash and accounts receivable, \$261,016; supplies, \$226,295; prepaid expenses, \$7,828; total, \$5,399,031. Liabilities—Capital stock (S. C. Co.), \$3,000,000; funded debt (S. A. Ry), \$391,792; accounts payable, etc., \$140,067; accrued interest, \$9,825; reserves, \$35,613; surplus, \$1,821,733; total, \$5,399,031.

The income account for the years 1908-12, follows:

	1908	1909	1910	1911	1912
Metal sales.....	\$2,346,429	\$2,407,862	\$2,418,071	\$2,014,219	\$2,594,867
Expenses	2,574,191	2,644,801	2,227,584	1,895,365	2,034,252
Profit	88,842	84,338	190,487	118,854	581,015

Lands, 34 claims, 562 acres, at Metcalf, in the Greenlee district, also about 600 acres mill and smelter sites at Clifton, Ariz., and some limestone claims on the San Francisco river. Three claims and a half interest in another claim were bought 1910, including the Weaver claim. Apparently the Greenlee group, adjoining the Clifton & New England property on the north is held under lease. The Shannon has a side-line agreement with the Arizona Copper Co., Ltd., by which extra-lateral rights are waived mutually, obviating all possibility of future litigation over apex rights.

Ore occurs between limestone and porphyry, under hematite gossans, the oxidized ores favoring the limestone, while the ores in the porphyry side are mainly silicious sulphides. The ore occurs in irregular deposits, some of which are up to 300' in the greatest dimension. Many of the orebodies are large, and though low-grade and bunchy, the quantity is very great. The upper levels in the mine show oxide and carbonate ores of 3 to 8% copper tenor; sulphide ores of 2 to 6% copper tenor are mined in the lower workings, the ores holding chalcopryite with a little chalcocite. The mine as a whole is deficient in sulphide ores, and about one-third of the production is silicious ore, too low in grade to smelt, not readily amenable to concentration, but giving good results with the Benny system of leaching when mixed with other ores. The concentrating ores average 2.5% and smelting ores about 4%.

The mine is extensively developed by shafts, tunnels and open pits, with underground workings reaching a depth of 1,300' below the crest of the mountain, and the mine had upwards of 25 miles of workings 1912, with considerable ore reserves. The mine is timbered with 12x12" square sets. Extraction is by 3 double-track tunnels, connecting with a 1,400' double-track incline tram leading to the Shannon-Arizona railway, with 6 ore bins at either end, the tramway, inclined at 36°, having 10-ton cars, operating in counterbalance, the steel cable passing around a 13' double drum, which runs a small air compressor serving as a brake.

The company owns the entire stock of the Shannon-Arizona Railway Co., capitalized at \$600,000, shares \$100 par, with principal and interest of the railway's \$600,000 6% 10-year bonds, guaranteed by the Shannon, and convertible into Shannon Copper Co. stock. The officers are: Nathan L. Amster, pres.; Chas. R. Jeffers, sec.; Alex. B. Clough, treas.; John W. Bennie, B. F. Spriggs and C. G. Cole, directors. This standard-gauge line, of about 10 miles length, was built and equipped at a cost of about \$600,000, the territory traversed being very rugged and including a 900' tunnel. The line was completed 1910, and not only is saving considerable money to the Shannon on ore haulage, but also gives immunity from the serious interferences formerly caused by frequent floods.

The 500-ton concentrator at Clifton, on the San Francisco river, 8 miles from the mine, has ore bins 100' long, in 2 sections, for first and second-grade ores. The mill is of steel, in 2 connected sections, terraced, the 64x95' upper section having two 9x15" Blake crushers, four 6' Huntington mills, a 220' Robins belt conveyor, Hartz jigs and Wilfley tables. The 57x144' lower section has 38 sand and slime tables. The 32x50' steel power house at the concentrator has two 250-h. p. Stirling water-tube boilers and a 300-h. p. Nordberg tandem-compound engine. Water is pumped from wells near the San Francisco river by a 600-gal. electric triplex pump.

The smelter, also located at Clifton, 7 miles from the mines, has 3 blast furnaces with a combined daily capacity of 1,800 tons of ore. The smelter treats concentrates and oxidized ores from the mines at Metcalf and pyritic ore from the Copper Belle mine of the Leonard Copper Co. The mixture is almost self fluxing. Above the charging floor are 23 ore bins, each 20x20x16', with chutes. Fumes from the blast furnace pass through a 10' dust flue to a 20x20x100' dust chamber with hopper bottom, discharging periodically into cars on a railway track in a tunnel beneath, fumes passing from the dust chamber through a 170' flue to a 150' steel smokestack. Slags are hauled by an electric locomotive. The converter plant has 2 stands and is capable of turning out 120,000 lbs. of copper daily. The briquetting plant for fine ore, concentrates and flue dust, has a daily capacity of 60 tons, and there is a small sampling mill in connection. Slag haulage, converters, slag elevators, dust conveyor, briquetting plant and custom sampler, are all operated electrically. The smelter power house has a 300-h. p. tandem compound condensing engine, direct-connected to blowers, and converter blast is supplied by a 250-h. p. Nordberg air compressor. Fuel is petroleum.

The company owns general stores, at Metcalf and Clifton, doing a combined annual business of about \$350,000. There are about 60 dwellings for employees. The Shannon owns and operates a water company. Forces are about 1,200 men at the mines, mill and smelter.

Costs have shown steady improvement, having been 14.6 cts. in 1906; 14.5 in 1907; 12.6 in 1908; 12.2 in 1909; 12.1 in 1910; 11.58 in 1911 and 11.42 in 1912.

Production has been as follows:

Year	Copper, lbs	Silver, oz.	Gold, oz.
1907	10,874,619	34,037	950
1908	16,281,983	50,189	925
1909	15,379,588	43,751	1,233
1910	15,873,481	47,726	984
1911	14,775,829	97,339	1,563
1912	16,511,525	202,975	3,129
1913 (1st 6 mos.)	6,892,745	55,620	1,147

SHASTA BELMONT MINING CO.

CALIFORNIA

Office: Carson City, Nev. Mine office: Winthrop, Shasta Co., Cal. Will E. Casson, pres.; Jas. T. Davis, sec.; G. G. LeMasters, treas.; B. A. Graham, supt., at last accounts. Capitalization \$1,000,000, shares \$1 par, non-assessable.

Lands, 7 claims, 120 acres, known as the Graham group, are in the Copper City district and in the west central part of the Shasta copper belt. The group is about 3 miles east of the Bully Hill mine and smelter, and 8 miles from the Mammoth mine. The property is said to have a surface outcrop resembling that of the Bully Hill mine. It is developed by a 75' shaft, 4 short tunnels and several opencuts, all showing streaks and bunches of high-grade copper ore, but this work is too superficial to open up important orebodies. Buildings include a cabin and smithy.

SHASTA COPPER CO.

CALIFORNIA

Idle. Office of mine: 502 California St., Redding, Cal. J. W. Girdner, pres.; Simeon D. Furber, sec. Organized April 20, 1907, under laws of Arizona, capitalization \$1,000,000, shares \$1 par.

Property includes the Pit River group of 25 claims, a mile south of Heroult, showing a good gossan, and the Arizona Consolidated group, 25 claims, 4 miles from Redding, formerly worked for placer gold and showing a mineralized zone of about 600' width, carrying low-grade auriferous and argentiferous copper ores.

SHASTA COPPER EXPLORATION CO. CALIFORNIA

Mine address: Redding, Shasta Co., Cal. M. E. Dittmar, mgr.; O. Scribner, sec., at last accounts. Lands were said, March, 1911, to be nearly 1,000 acres, lying between the Balaklala and Iron Mountain mines, near Kennett, and including the Spread Eagle group of 22 claims, reported to be held under an 18-month bond and lease at \$125,000. The property has 8 tunnels, of about 3,000' aggregate length, No. 7 tunnel having cut 3 small stringers of copper ore.

Negotiations for the sale of the property to the Mammoth Copper Co. were pending, early 1913.

SHASTA COUNTY GOLD & COPPER MINING CO. CALIFORNIA

Office: Bacon Bldg., Oakland, Cal. Mine office: Kennett, Shasta Co., Cal. A. J. Hough, pres. and gen. mgr.; Thos. P. Hogan, vice-pres.; M. C. Hough, sec.; preceding officers, D. A. Lyons, R. E. Reeves, L. Daily and M. A. McGinnis, directors. Organized Sept. 15, 1909, under laws of California, capitalization \$500,000, shares \$1 par.

Lands, 6 claims, unpatented, 110 acres, having several short tunnels, aggregating about 200' length, and a considerable number of pits and trenches showing copper at 10 different points and exposing 1 vein of 50' estimated average width, carrying auriferous and argentiferous copper ore. The workings show occasional small bunches of good malachite, bornite and chalcopryite ore. Idle several years.

SHASTA MAY BLOSSOM COPPER CO., CONS. CALIFORNIA

Office: 1009 Mills Bldg., San Francisco, Cal. Mine office: Winthrop, Shasta Co., Cal. Col. Morton Lindley, pres.; Lucius A. Booth, vice-pres.; S. Peter, sec.-treas., at last accounts. Organized 1903, under laws of Arizona, as a reconstruction of the Shasta May Blossom Mining & Smelting Co., capitalization \$10,000,000, shares \$1 par.

Property, known as the Keith group, has 18 claims, about 300 acres, located 13 miles from a railway and 27 miles N. E. of Redding, in the Pittsburgh or Copper City district. The claims show prominent outcrops and have several deposits between porphyry footwalls and slate hangings. The main outcrop, said to be traceable about 1,500', shows ore giving assays of 2 to 7% copper and about \$11.50 per ton in combined gold and silver values. The middle vein, 5 to 40' wide and said to be traceable 1,900', carries chalcocite, bornite and chalcopryite ore, and is opened by tunnels of 200', 300' and 650', with about 1,500' of workings said to show a considerable tonnage of sulphide ore. The West vein, reported to be upwards of 100' in width, has a 100' shaft and 400' tunnel which show ore giving assays of 2 to 7% copper and \$2 to \$2,000 per ton in combined gold and silver values. The mine, as a whole, is reported to have about 3,500' of workings.

Equipment includes a gasoline hoist, air compressor and electric light and power. There is a 20x90' machine shop covered with corrugated iron.

SHATTUCK-ARIZONA COPPER CO. ARIZONA

Office: Duluth, Minn. Mine office: Bisbee, Cochise Co., Ariz. Thos. Bardon, pres.; A. Guthrie, vice-pres.; Archibald M. Chisholm, sec.-treas.; Lemuel G. Shattuck, managing director; preceding officers and Louis W. Hill, directors; Norman E. LaMond, asst. sec.; Arthur Houle, supt. Organized March 22, 1904, under laws of Arizona, capitalization \$3,500,000, shares \$10 par, nonassessable; fully issued. Dividend payments were \$2 in 1910; \$1 in 1911; nothing in 1912; \$1.50 up to Oct. 1, in 1913. Company has about 800 shareholders, with about 275,000 shares of stock owned by the directors. Company is closely connected, in ownership and management, with the Denn-Arizona Mining Co. National Shawmut Bank, Boston, registrar; Old

Colony Trust Co., Boston, transfer agent. Shares are listed on the Boston Stock Exchange. Annual meeting, third Saturday in February.

Property comprises 8 claims, patented, 120 acres, bought for \$1,022,500, lying in the northeastern portion of the Bisbee camp, about one-half mile south of the original workings of the Copper Queen, and to the north of the Calumet & Arizona. The property shows carboniferous limestone, with intrusive porphyry dikes, and a big fault, covered with a silicious gossan of 30 to 50' width. Ores are oxidized, down to 800', with low-grade sulphides at depth.

The orebodies occur as irregular replacements along certain bedding planes, and along dike contacts.

The mine is opened by a 935' three-compartment shaft, 15x4' 6" in size, connected with the Cuprite shaft of the Copper Queen, on the 800' level, with the Powell shaft of the Calumet & Arizona, and also with the workings of the Wolverine & Arizona. Development was begun Aug., 1904, and ore shipments begun Sept., 1906, continuing until Nov., 1907, when the panic put a stop to all work, for some months. Production was resumed Dec. 4, 1908. The mine is opened by levels at 100' intervals from the 300 to 900' points, inclusive, and at the end of 1912 had 44,762' of workings.

Development work is centered in the area above the 600' level. About 1,000' of new openings are made per month. The 300' level shows an extension of the orebody originally opened on the 400' level, averaging 40' in width with 15% copper, 7 oz. silver and \$1 gold. This orebody has been exposed horizontally for a distance of 250' and to a vertical depth of 160', or about 60' below the 400' level. The 500' and 600' levels show lead-silver ores, along a N.-S. fracture, in irregular seams and kidneys for a distance of about 700'. Oxidized copper ores occur in Devonian limestone on the 500' and 600' levels in irregular shoots in an underground gossan, which has been prospected over a length of 650'. The oxidized zone between the 600' and 800' levels carries 3 ore shoots, partially developed, averaging 6% copper. The sulphide ores come in between the 700' and 800' levels, occurring in shoots, estimated to contain 104,000 tons of 3.5% copper ore, and extending downward to the 900' level, where there is a considerable tonnage of massive sulphides of about the same grade blocked out. The company's ore reserves are estimated at 40,000 tons of 15% ore, 110,000 tons of 7% ore, 185,000 tons of 6% ore and 104,000 tons of 3.5% ore.

There are 12 mine buildings, including a 24x42' machine shop, 16x24' carpenter shop, smithy, boiler house, engine house, warehouse, sawmill, and a changing house with accommodations for 200 men.

The 750-h. p. steam plant has five 150-h. p. boilers. The main hoist is a 18x48" Allis-Chalmers duplex double-drum engine, working under 125 lbs. steam pressure, with 2 drums, each carrying 1,500' of 1½" round steel cable, capable of handling continuously a 15,000-lb. unbalanced load at a vertical hoisting speed of 2,000' per minute. The air plant includes a 40-drill Sullivan cross-compound air compressor. Fuel is petroleum, with a normal yearly consumption of about 16,000 bbls.

A 3,300' aerial tram of 500 tons daily capacity, with average grade of 18%, supported by 14 towers of 12 to 40' height, built of 12" timber and set on concrete foundations, leads from a 1,000-ton ore bin near the shaft to the El Paso & Southwestern railway, the buckets discharging loads direct into 50-ton ore cars.

The ore is smelted by the Calumet & Arizona Mining Co., at Douglas, under a 5-year contract dating from July 1, 1913. About 250 tons are shipped daily, returning about 7.5% copper, with appreciable gold and silver values.

Production has been as follows:

Year.	Copper, lbs.	Year.	Copper, lbs.
1906.....	2,541,680	1910.....	14,751,000
1907.....	5,091,542	1911.....	4,596,973
1908.....	301,359	1912.....	2,510,339
1909.....	1,787,649	1913 (first 9 mos.).....	10,180,322

SHAUGHNESSY MINE.

MONTANA

Address: care Reilly Bros., owners, Clinton, Missoula Co., Mont. Property, 7 miles north of Clinton, in the Wallace district, is developed by a 700' shaft, showing gold and silver-bearing copper ore.

SHAWMUT CONSOLIDATED COPPER CO. COLORADO & UTAH

Dissolved by court decree, March, 1911. Fully described Vols. VIII and X.

SHAWNEE-WYOMING COPPER MINING CO.

WYOMING

Office: 926 North 10th St., Waco, Texas. Mine at Holmes, Albany Co., Wyo. A. M. Coffin, pres. and gen. mgr. Organized as a merger of the Shawnee Copper Mining Co. and the Kyhaco Mining Co.

Property, 10 claims, 200 acres, 6 miles from the New Rambler mine, in the French Creek district of Medicine Bow mountains. Claims show fissure veins in granite and bedded deposits between schist and quartzite. The vein of copper-stained limonite ore is developed by a 115' two-compartment shaft. The company also holds the property formerly owned by Ak-Sar-Ben Copper Co., which had a strong gossan capping of hematite and limestone, opened by an 80' shaft. Company is said to have found some ore giving good assays in copper, silver and gold.

Equipment includes a 45-h. p. steam plant and 4 mine buildings. Idle since organization.

SHELDEN & COLUMBIAN COPPER CO.

MICHIGAN

Office: care J. H. Rice, Houghton, Mich. Lands lie next north of the Isle Royale mine. Idle. Described Vols. I and II.

SHIPPER COPPER MINING CO.

NEVADA

Office and mine: Luning, Mineral Co., Nev. Frank Everett, pres.; S. J. Dillabaugh, supt. Property, 4 claims, 5 miles S. E. of Luning, developed by a 300' shaft, shows a small vein of high-grade copper ore, shipments from which are reported to have yielded 8% copper. Was developing with a small force and shipping ore, late 1913.

SHONEE MINING & MILLING CO.

WASHINGTON

Office: Cheney, Wash. Lands near Danville, Ferry Co., Wash., developed by a 218' shaft and an 855' tunnel, show a 4' contact vein between granite and slate. Ore is a cupriferous hematite. Property was under bond and lease to Charles and Walter James, of Republic, Wash., at last reports.

SHOSHONE MINE

NEW MEXICO

Idle. Office and mine: Taos, Taos Co., N. M. Alex. Gusdorf, owner and manager, at last accounts. Lands, 4 claims, developed by a 175' shaft, with drifts on the 100' and 150' levels, showing an 8' vein with a 2' paystreak, carrying 5% copper, 10 to 12 oz. silver and \$60 to \$80 gold per ton, balance of vein being concentrating ore, claimed to average 5 to 8% copper, 4 to 5 oz. silver and \$10 to \$12 gold per ton.

SHOSHONE MOUNTAIN MINING CO.

WYOMING

Idle. Mine office: Meetetse, Big Horn Co., Wyo. P. W. Gates, manager, at last accounts. Lands, on Spar mountain, show a wide vein carrying mainly silver-lead-copper ores, opened by a 560' tunnel, on the Smuggler claim.

SIERRA DE ORO GOLD MINING & MILLING CO.

ARIZONA

Office and mine: Clifton, Greenlee Co., Ariz. F. T. Eldredge, pres.;

W. H. Waite, sec.-treas.; L. P. Potter, mgr.; Benj. M. Crawford, supt., at last accounts. Lands, 15 claims, near the Clifton Consolidated, and a 5-acre mill site, on the San Francisco River. Development is by tunnels, showing 4 parallel blind veins. A 550' crosscut tunnel shows a 10' vein giving assay values of 14% copper and up to \$10 gold per ton, and a 4' vein giving assays of 14% copper and \$48 gold per ton. Idle many years and apparently out of business.

SIERRA RANGE COPPER CO.**CALIFORNIA**

A. L. Beardsley, superintendent, Genessee, Plumas Co., Cal. Property, the Mountain Lion group, shows a vein of gold-silver-copper ore, developed by tunnels. Company is doing work on several prospects, but reports that development is not sufficiently advanced to warrant giving details.

SIGMA CONSTRUCTION & DEVELOPMENT CO.**NEW MEXICO**

Mine office: Hillsboro, Sierra Co., N. M. A. G. Viegis, manager, at last accounts. Property, known as the Wicks mine, on the southern slope of the Animas peak, is developed by a 380' two-compartment shaft, cutting a vein of gold-copper ore at depth of 355'. Equipment includes steam power.

SIGNET GOLD & COPPER MINING CO.**UTAH**

Office: 513 Felt Bldg., Salt Lake City, Utah. Mine near American Fork, Utah Co., Utah. W. S. McConahy, pres.; J. H. Rothwell, vice-pres.; W. S. Zehring, sec.; W. H. Young, treas., and A. L. Hoppaugh, directors. Organized Nov, 1903, under laws of Utah, capitalization \$75,000, shares 25 cts. par, assessable, with 8 assessments levied to end of 1912; issued, 93,468 shares.

Lands, 6 claims, patented, known as the Signet group, in American Fork canyon, slightly developed by tunnel, showing mainly silver-lead ore. Idle some years.

SILICA GOLD & COPPER MINING CO.**IDAHO**

Probably idle. Office: Wallace, Idaho. Letter unclaimed at former mine office, St. Joe, Kootenai Co., Idaho. Wm. Sites, vice-pres.; Adolph Haupt, sec., at last accounts. Lands, 11 claims, on the north branch of the East fork of the St. Joe river, west of the Monitor mine and about 1½ miles from the Puget Sound railway, in the Grand Fork district. The property has an upper tunnel showing ore assaying up to \$12 in gold and a 140' lower crosscut tunnel showing a 15' vein, with a 4' paystreak giving assays of 4.3 to 20% copper.

SILVER BELL MINING CO.**UTAH**

Idle. Office: 25 East North Temple St., Salt Lake City, Utah. Mine office: Park City, Summit Co., Utah. Chas. A. Tyng, pres.; M. E. Christopherson, vice-pres.; W. J. Bateman, sec.-treas. Organized Oct. 28, 1899, under laws of Utah, capitalization \$250,000, increased 1906, to \$1,000,000, shares \$1 par, assessable. Has levied 14 assessments. Lands, 6 claims, patented, in Thaynes canyon, 5 miles from railroad, slightly developed.

SILVER CLIFF GOLD & COPPER MINING CO., LTD.**IDAHO**

Office: Wallace, Idaho. Mine address: Larson, Shoshone Co., Idaho. Jas. D. Young, pres., treas. and gen. mgr. Edw. C. Young, sec. Capitalization \$1,500,000, shares \$1 par, assessable; an assessment of 5 mills was levied Oct. 11, 1913, with delinquent sale, Dec. 10, 1913. Lands, 18 claims, 7 miles from Mullan, developed by 4 shallow shafts and 3 tunnels, the lower of 850' and longest of 1,500', showing chalcocite, bornite and chalcopyrite ore, giving assays up to 43% copper, with some lead and fair gold values. Equipment includes a Pelton wheel, operating under a head of 240', and an 8-drill air compressor.

SILVER CREEK MINING & MILLING CO.**WASHINGTON**

Office: 804 East Washington St., Greensburg, Ind. Mine office: Keller,

Ferry Co., Wash. R. L. Boyle, pres. and gen. mgr.; Ira J. Hollensbe, sec.-treas., at last accounts. Organized Dec., 1900, under laws of Washington, capitalization \$75,000.

Lands, 4 claims, patented, 80 acres, well watered and timbered, including the Gold Cord mine, in the San Poil district, 5 miles N. E. of Keller. Silver creek, near by, is capable of producing considerable water power. The property shows a fissure vein, in diorite of 3 to 8' width, with a 30" paystreak of ore carrying cuprite, azurite, malachite, bornite and chalcopyrite, in a quartz gangue. The vein is opened by a 304' shaft and by tunnels of 130' and 620', with tunnels connected by a 195' winze. Idle some years.

SILVER FISSURE MINING CO.

MONTANA

Idle. Secretary and office: A. W. S. Cochrane, 30 Broad St., New York. Mine near Polaris, Beaverhead Co., Mont. Property is the Polaris mine, formerly operated by F. Aug. Heinze, carrying silver, gold and copper ores, latter produced in small quantities as a byproduct. Equipment includes steam and electric power, and there is a 100-ton smelter, the mine and smelter formerly employing about 100 men. Shut down at last report.

SILVER HILL CONSOLIDATED COPPER CO.

ARIZONA

Letter unclaimed at former offices: Tucson, Ariz., and Silver Bell, Pima Co., Ariz. Col. Wm. Herring, pres.; T. M. Smith, sec., at last accounts. Capitalization \$3,000,000, shares \$1 par. Lands, 6 patented claims, 120 acres, in the Silver Bell mountains, 3 miles from Silver Bell, opened by tunnel, with about 1,000' of workings, having an extreme depth of 200', showing copper carbonates and sulphides, apparently occurring as contact deposits between limestone and granite. Idle several years and presumably out of funds.

SILVER KING MINE.

ARIZONA

Address: care Messrs. Wall and Duffy, Superior, Pinal Co., Ariz. The property, 3 miles from Superior, on the Stoneman grade, is an old silver mine, popularly credited with a production of \$10,000,000, and known to have paid \$1,950,000 in dividends up to July, 1887. Opened to a depth of 1,900', the mine was originally worked for gold and silver, copper ore in the form of tetrahedrite coming in at a depth of about 310' and continuing to depth of 510', below which very high-grade silver ores were again encountered. There are about 6 miles of old workings.

More recent operations were limited to work above the water level, 70' from surface, in a number of narrow stringers carrying high-grade silver-copper ores.

The property was bonded 1913, to John Hays Hammond for \$200,000.

SILVER KING MINES, LTD.

BRITISH COLUMBIA

Office: Trail, B. C. Mine address: Nelson, Kootenay district, B. C. R. H. Stewart, pres.; S. G. Blaylock, vice-pres.; T. W. Bingay, sec.; W. M. Archibald and R. S. Lennie, directors. Company is owned jointly by the Kootenay Bonanza Co. and the Consolidated Mining & Smelting Co. of Canada, Ltd., in the proportion of one-quarter and three-quarters, respectively.

Lands, 5 claims, on Toad mountain, include the old Silver King mine, formerly owned and operated by the Hall Mining & Smelting Co., Ltd. Mine is opened by a shaft to the 10th level, showing 3 well-defined veins in diabase schist. The ore occurs in those portions of the veins which are intersected by 2 dikes, and in the altered surface zone is principally bornite, with tetrahedrite, iron pyrites and silver occurring in the unaltered zone below. Gold is present in small amounts. Considerable ore was extracted in the past from above the 5th level in the Main vein. The South vein and the K vein are practically untouched. The Main vein is lower in silver

but higher in copper than the South vein, and the K vein is higher in silver than either of the others. The total ore reserves in the mine are conservatively estimated at 100,000 tons. Ore in the Main vein has been proven to a depth of 1,130' by diamond drill borings.

Equipment includes electrical motors of 50-h. p., a 100-h. p. electric pump, an 1,850' tramway, and all necessary mine buildings.

SILVER LAKE MINES.

COLORADO

Mine address: Silverton, San Juan Co., Colo. Owned by the American Smelting & Refining Co. and operated under lease by Otto Mears and John Slattery, of Ouray, Colo.

SILVER MOUNTAIN MINE & MILL CO.

COLORADO

Mine office: Empire, Clear Creek Co., Colo. F. G. Bishop, superintendent, at last accounts. Property has gold and silver-copper ores. Equipped with water power and a .25-ton concentrator. Presumably idle.

SILVER MOUNTAIN MINING CO., LTD.

IDAHO

Office: Potlatch, Idaho. Letter unclaimed at former mine office, Mullan, Shoshone Co., Idaho. E. B. Wilkins, pres.; Samuel J. Tennal, vice-pres.; W. E. Ponto, sec.; W. E. Horstkotti, treas., and Phil Tice, directors; Cole Frazier, mgr.

Lands, 9 claims, 4 patented, near the Alice mine, on St. Joe Gulch, shortly west of the Morning Mill, near Mullan. The mine has 3 tunnels, lower of 285', and a 500' crosscut tunnel intersects an 8' vein carrying ore giving assays of 2% copper, 3 oz. silver and \$1.80 gold per ton. Equipment includes a small steam plant and an air compressor. Was developing with a small force, late 1913.

SILVER PEAK MINE.

NEW MEXICO

Address: Alma, Socorro Co., N. M. The mine has an 80' tunnel, showing ore said to average 24% copper, 24 oz. silver and \$4 gold per ton.

SILVER QUEEN MINE.

UTAH

Office: 53 W. First St., Salt Lake City, Utah. E. G. Holding, owner. Property, 80 acres, patented, near Midway, in the Snake Creek district, Wasatch Co., Utah, 6 miles S. W. of Heber on the D. & R. G. R. R. Ores are complex, carrying lead and zinc as well as copper. Development consists of 3 tunnels, showing gold and silver ore. Inactive.

SILVER QUEEN MINING CO.

WASHINGTON

Mine office: Kettle Falls, Stevens Co., Wash. J. J. Budd, superintendent. Owns sundry claims, 2 miles south of Kettle Falls, developed by shaft showing silver-copper ore.

Equipment includes steam power plant. Presumably idle.

SILVER REEF MINING & SMELTING CO.

ARIZONA

Office and mine: Vekol, Pinal Co., Ariz. J. V. Neuhaus, superintendent, at last accounts.

Lands include the Lake Shore and the Silver Reef mines, originally worked for their silver ores. Development is by a 375' shaft and 425' tunnel. Ores are silver-lead and copper.

Equipment includes a gasoline hoist and air compressor, and a 50-ton smelter, long idle. Company was planning extensive development work, late 1911, but apparently has done no work in recent years.

SILVER ROCK MINING CO.

IDAHO

Office and mine: Wallace, Shoshone Co., Idaho. H. J. Rossi, pres.; A. P. Bailey, vice-pres.; Geo. Austin, sec.-treas. and gen. mgr.; preceding officers, A. E. Bronson, Sig Hofslund and V. E. Waltman, directors. Organized July, 1909, capitalization \$1,500,000, shares \$1 par; issued, 900,000 shares.

Lands, 8 claims, next east of the Argentine and west of the Rainbow mine, carry the extensions of 2 Rainbow veins, in Shield's gulch, in the

vicinity of Osburn. The property shows a heavy gossan, carrying gray copper ore, and the mine has 4 tunnels, the longest 450'.

The company was planning, June, 1913, to consolidate with the Rainbow Mining & Milling Co., Ltd.

SILVER SEAL MINING CO.

MEXICO

Letter unclaimed at former office, Los Angeles, Cal. Mine office: Pilares de Teras, Sonora, Mex. Fred O. Colsen, lessee and manager. Lands include El Aguaje mine, 12 miles east of Nacozari, showing a fissure vein in andesite rock cut by granite and carrying narrow paystreaks of gray copper, chalcopryrite and galena ore. The mine has yielded ore assaying up to 15% copper and 400 oz. silver per metric ton, and in 6 months the company shipped, by pack-trains, about \$25,000 worth of ore said to have given smelter returns of \$75 to \$90 per ton, and the lessee shipped about \$48,000 worth of ore during the first 7 months of 1910. Property worked intermittently during 1912-13.

SILVER SPAR MINING CO.

COLORADO

Office: 834 Equitable Bldg., Denver, Colo. Thos. H. Jenks, superintendent, White Pine, Gunnison Co., Colo. Property, the Spar silver mine, shows a vein with lead-copper ore; developed by 1,300' tunnel. Has gaso-line engine.

SILVER TIP GROUP.

NEW MEXICO

Address: care P. M. Shelly & Son, Alma, Socorro Co., N. M. The property comprises 6 claims, 120 acres, in the southern end of the Mogollon range, 3 miles from the main wagon road between Mogollon and Silver City.

Development is by a 100' shaft showing gold and silver-bearing copper ores, said to average \$65 per ton.

SILVER TIP MINING & POWER CO., LTD.

WASHINGTON

Office: 960 Empire Bldg., Seattle, Wash. A. Julian, pres.; M. Hardman, sec.; other directors, J. F. Reed, J. B. Bruen and W. O. Browning; C. H. Waters, engr. Organized Jan. 15, 1910, under laws of Washington, capitalization \$1,000,000, shares \$1 par; issued, 658,804 shares.

Lands, 557 acres, including the Lakeside mine, in the Cascade mountains, Skagit county, said to carry gold, silver, lead and copper ores. No trace of operations securable.

SILVERED-COPPER MINING CO.

BRITISH COLUMBIA

Office: 1621 Madison St., Denver, Colo. Mine office: Aldermere, Atlin district, B. C. F. Thoman, pres.; C. W. Peaslee, vice-pres.; C. A. Hubbard, sec-treas.; C. E. Thoman, gen. mgr. Organized March 23, 1908, under laws of Arizona, capitalization \$1,000,000, shares \$1 par, nonassessable; issued, 540,219 shares. Debentures, \$50,000 authorized and unissued.

Lands, 5 claims, 250 acres, in the Hunter Basin, Omineca district, about 15 miles from the railway at Telkwa. The property shows a bedded agglomerate of volcanic rocks, chiefly diorite, beds standing almost perpendicular and striking N. 35° E. Orebodies occur as true fissure veins in diorite. Ores contain bornite and chalcocite and assay up to 45% copper, with good silver values.

Development is by a short tunnel and numerous pits and opencuts, with a total of about 170' of workings, April, 1913.

The mine has no power equipment, but a water power plant is under consideration. A concentrator is also planned, but ore reserves should first be developed.

The company is pinched for funds, but apparently has a valuable property, which, if handled right, may develop into a paying mine.

SILVERFIELDS MINING CO., LTD.

NEVADA

Secretary's address: J. M. Hamilton, Suffolk House, London, E. C.,

Eng. Mine office: Golconda, Humboldt Co., Nev. H. M. Eakin, manager. Organized Dec. 27, 1906, in Great Britain, as Golconda Consolidated Co., Ltd., and changed name to present title Feb., 1909, capitalization £250,000, shares £1 par; issued, £143,353, fully paid.

Owens sundry claims, with a third interest in the Honolulu group, balance of which is owned by the Golconda-Nevada Copper Co., in the Kennedy and Battle Mountain districts, 8 miles west of Millers.

Development is by a 250' shaft showing a 3' vein in limestone said to assay 8% copper, 26% lead, 390 oz. silver and \$4 gold. Equipment includes a 25-h. p. hoist and necessary mine buildings.

SIMILKAMEEN MG. & SM. CO., LTD.

BRITISH COLUMBIA

Office: Vancouver, B. C. Mine near Princeton, Boundary district, B. C. Fred Buscombe, chairman; W. H. Armstrong, managing director; Chas. F. Law, sec., at last accounts. Organized Feb. 8, 1906, under laws of British Columbia, capitalization \$2,000,000, shares \$10 par.

Owens the St. Lawrence and St. George groups, 5 claims, 3 crown granted, about 300 acres, 3 miles from Tulameen City, at the head of Bear creek, a few miles from the Similkameen division of the Great Northern railway. Claims have a 250-h. p. waterfall, available for power purposes. Development is by 4 shallow shafts of about 50' depth each, besides a short crosscut tunnel and numerous trenches. The work shows a strong ore-body between schist and granite, with intrusive porphyry dikes. The St. Lawrence mine has an 8' vein of massive cupriferous iron sulphide, giving average assays of about \$10 per ton in copper, silver and gold. The St. George group shows a 4' vein, carrying ore with quartz gangue, giving average assays of \$1.38% copper, 2.08 oz. silver and \$53 gold per ton. Idle some years.

SIN RIVAL COPPER CO.

ARIZONA

Mine office: Superior, Pinal Co., Ariz. Wm. G. Kirchoff, mgr.; J. H. McCabe, supt., at last reports. Lands, 25 acres, near the Magma Copper Co.'s Silver Queen mine and near the Lake Superior & Arizona property, in the Pioneer district. Claims show ore giving good assays in silver and gold. No returns secured.

SINALOA SMELTING & REFINING CO., S. A.

MEXICO

Company, a subsidiary of the Pacific Smelting & Mining Co., owns a concession from the Government for a smelter at Mazatlan, or elsewhere in the state, for a period of 20 years from April 17, 1906. It covers the entire state of Sinaloa and is particularly exclusive in its terms.

SISKIYOU COPPER MINING CO.

CALIFORNIA

Mine office: Hutton, Siskiyou Co., Cal. W. R. Oxley, pres.; Robt. Hall, vice-pres.; C. E. Monteith, sec., at last accounts. Organized Oct. 10, 1905, under laws of Idaho, capitalization \$1,000,000, shares \$1 par. Lands, 4 claims, known as the Cook & Green group, near the Blue Ledge mine, in the Upper Applegate district, show a vein claimed to have a surface width up to 200', developed by 3 tunnels, of 75', 100', and 125', all in copper ore. Idle some years and probably dead.

SIXTEEN TO ONE MINE.

NEW MEXICO

G. F. Hall, owner, Tusas, Rio Arriba Co., N. M. Property has a deposit of silver-bearing copper ore, developed by shaft equipped with steam power and hoist.

SKINCUTTLE MINING CO.

BRITISH COLUMBIA

Mine office: Jedway, Queen Charlotte island, B. C. Property, near Skincuttle inlet, at the southern end of Queen Charlotte island, on which apparently little, or no mining work has been done. Idle and presumably defunct.

SKULL VALLEY MINING & MILLING CO.**ARIZONA**

Letter unclaimed at former office, Bisbee, Ariz. Mine office: Skull Valley, Yavapai Co., Ariz. F. J. McAfee, gen. mgr.; C. E. Williams, mgr., at last accounts. Organized 1910. Lands, 22 claims, held under bond and lease from T. M. Sanders, include the Roosevelt, Bryan and Hearst group of claims, about 4 miles from Skull Valley, in the foothills of the Copper Basin mountain. Claims show 2 veins, 1 of 12' estimated width. The mine has an 80' two-compartment shaft, developing a vein about 3' wide. The development of large reserves in the Commercial mine nearby, owned by the Phelps-Dodge interests, and increased activity at Zonia generally, have made the property interesting.

SLEEPING BEAUTY COPPER CO.**ARIZONA**

Office: Globe, Ariz. Geo. E. Shute, pres.; T. C. Hendricks, vice-pres.; I. W. Frye, sec.-treas.; Dr. E. R. Oliver, fiscal agt.; Wade Sotel, supt.

Lands, 20 claims, about 4 miles north of Miami, are under lease to Messrs. Dunham & Jones.

Property shows intrusive dikes of diorite and porphyry in limestone, along which several veins of gold-copper ore are noted.

Development is by a 40' shaft and 350' tunnel, planned to connect at a depth of about 130' in the shaft. Samples taken from the outcroppings of a well-defined vein are said to have assayed 12% copper, 130 oz. silver and \$2 gold, which cannot be considered as representative of the vein as a whole, but merely a rich specimen.

SLOCUM COPPER CO.**ARIZONA**

Mine office: Phoenix, Maricopa Co., Ariz. John G. Hardin, president and general manager. Lands, in the Winifred district, 22 miles north of Phoenix, have shafts of 130' and 150', showing ore assaying well in copper, silver and gold.

SMITH, SAWYER & CO.**ARIZONA**

Office: Kingman, Mohave Co., Ariz. Anson H. Smith, manager. Property, 9 claims, 160 acres, in the Cedar Valley district, 25 miles from a railway.

Claims show numerous fissure veins in granite, among which is a quartz vein carrying ore said to average 4.5% copper, 8% molybdenite, 5 oz. silver and \$1 gold.

Development is by a 30' shaft, and tunnels of 30' and 85', with about 150' of workings.

SMOKEHOUSE MINING CO.**MONTANA**

Is a subsidiary of the Davis-Daly Copper Co. At Butte, Mont.

SMOKEY DEVELOPMENT CO.**NEVADA**

Office: 50 Congress St., Boston, Mass. Mine office: Ely, Nev. S. H. Williams, pres. and gen. mgr.; E. P. Anthony, vice-pres.; H. P. Eastwood, sec.; A. L. Kingsbury, treas., and T. J. Hammond, directors. Organized Dec. 16, 1911, under laws of Maine, capitalization \$2,000,000, shares \$10 par, fully paid; issued, 148,000 shares. State Street Trust Co., Boston, registrar; American Trust Co., Boston, transfer agent. Stock is listed on the Boston curb.

Lands, 12 claims, 175 acres, patented, including former holdings of the Turner Ely Copper Co., in the Robinson district. Country rock is similar to that of the Nevada Consolidated, which it adjoins, about 60 acres showing chalcocite disseminated in monzonite-porphyry ore of low grade, and a richer zone of chalcocite and carbonate ores along the limestone contact. Ore in the contact zone is said to assay up to 10% copper, with fair gold and silver values. The ore in the porphyry proper is said to average about 1.5% copper. Assays made of the sludge from 30 different places in 7 drill

borings, between depths of 115' and 360' gave indicated values of from 1% to 5.6% copper.

Development is by a 1,700' tunnel, planned to have an ultimate length of 1,900 to 2,000' and give a maximum depth of 450', with portal about 30' above the Nevada Northern railway, thus affording every facility for the economical handling of ore.

Equipment includes an air compressor, smithy and assay office.

SNAKE RIVER CONSOLIDATED MINING CO.

WYOMING

Office: 430 Railway Exchange Bldg., Denver, Colo. Mine P. O.: Columbine, Routt Co., Colo. L. A. Pease, pres., treas. and gen. mgr.; A. L. Arnold, sec. Organized July, 1906, under laws of Wyoming, capitalization \$5,000,000, shares \$1 par, nonassessable; fully issued, with \$2,500,000 stock assigned to a trustee, for the benefit of the treasury. Annual meeting, second Wednesday in July.

Lands, 9 lode claims, 2 patented, 180 acres, and 520 acres of placer claims, unpatented, in the Encampment or Battle district, 26 miles S. W. of Encampment, the nearest rail point. The property shows granite and diorite, reported by management to have veins carrying auriferous galena, with strike of N. 25° W., and cross veins carrying copper, striking at nearly right angles. The management reports the galena vein to have an extreme width of 120', with length of 4,500', and estimates the galena ore to average 10 to 20% lead, free from zinc, and 8 to 800 oz. silver, with from a trace to very high gold assays which, if true, would make the mine a bonanza producer. The copper veins are undeveloped, but show a variety of oxidized ores, at surface. Development is by numerous pits and shafts, of 10 to 106' depth, and numerous short tunnels, from 30 to 500' in length, nearly all openings showing ore. The management reports 5,000 tons of ore blocked out for stoping. The mine is without power equipment, and is not favorably regarded.

SNOW CLIFF COPPER MINING CO., LTD.

IDAHO

Office: Court House, Wallace, Idaho. G. W. Dougherty, secretary. Lands, near Lookout, Nez Perce Co., Idaho, adjoining the Silver Cliff and Liberty mines, are slightly developed. Idle except for annual assessment work.

SNOWSHOE GOLD & COPPER MINES, LTD. BRITISH COLUMBIA

Secretary and office: H. W. Batty, 6 Throgmorton Ave., London, E. C., Eng. Mine office: Phoenix, Boundary district, B. C. Geo. S. Waterlow, D. L., J. P., chairman; C. K. Milbourne and C. G. Pym, directors. Organized Jan. 20, 1901, under laws of Great Britain, capitalization £250,000, shares £1 par, issued £198,855.

Profit and loss account for year ending Sept. 30, 1911, showed: Royalties on ore shipped, £1,974; fees, £30; debit balance, £20,499; general expense, £1,342; income tax, £251; loss on exchange, £45.

Company's mines were operated June, 1906, to April, 1911, by the Consolidated Mining & Smelting Co. of Canada, Ltd., on a royalty basis.

Lands, 4 claims, freehold, 120 acres, at Phoenix, B. C., about a quarter mile from the Granby. The claims show fissure replacements of 25 to 200' width, with an average of about 100', traceable 1,000', carrying chalcopyrite averaging about 1.3% copper and \$1.25 gold per ton, ore occurring occasionally in distinct bodies, somewhat mixed, but mainly disseminated, in minute particles, through a silicious to calcareous gangue, carrying occasional magnetite and specular hematite. Development is by tunnels of 200', 250' and 600', and shafts of 200' and 350', the main shaft having 3 compartments, but the bulk of the production is secured from opencast workings.

Equipment includes a 350-h. p. steam plant, now held in reserve as an

auxiliary, the property being operated by commercial electric current from the Bonnington Falls plant. There is a 150-h. p. double-drum electric hoist, raising 2-ton skips, and the high-pressure half of a 30-drill Rand Corliss compound condensing air compressor.

For the year ending Sept. 30, 1911, the mine produced 60,855 dry tons of ore averaging 1.19% copper, 0.27 oz. silver and 0.066 oz. gold. Total production has been as follows.

	1906.	1907.	1908.	1909.	1910.	1911.
Copper, lbs.....	175,602	2,464,530	1,113,537	3,616,739	3,667,809	1,445,040
Silver, oz.....	1,840	29,285	13,240	35,072	36,830	16,546
Gold, oz.....	510	5,842	2,496	9,547	10,921	3,990

This production is without deduction of smelter losses.

SNOWSHOE MINING CO.

IDAHO

Office: 608 Cedar St., Wallace, Idaho. Mine office: Mullan, Shoshone Co., Idaho. Fred Stroh, sec.; Paul Lucia, gen. mgr. Organized Sept., 1903, under laws of Idaho, capitalization \$1,000,000, shares \$1 par; assessable; fully issued. Shares are listed on the Spokane Stock Exchange.

Lands, 8 claims, patented, adjoin the Snowstorm on the east and supposedly carry the extension of the Snowstorm fault, at the head of Gentle Annie gulch, near the top of Snowstorm mountain, in the Hunter district, 1 mile from a railway. The property shows Revett quartzite, mineralized for 30' in the Snowstorm fault, with some cuprite, azurite and chalcopyrite, giving assays up to 9% copper and 8 oz. silver per ton. Development is by crosscut tunnels, longest 1,400', and a 400' drift, showing a mineralized zone of 30 to 40' width, carrying various copper ores sparsely disseminated. Equipment includes an air compressor power house and several buildings. An agreement was made 1913, with the Snowstorm Mining Co., for the development of Snowshoe ground at greater depth through one of the Snowstorm's lower tunnels.

SNOWSTORM APEX MINING CO.

IDAHO

Office: Hotel Vallamont, Spokane, Wash. Mine office: Larson, Shoshone Co., Idaho. A. B. Babb, president, at last accounts. Organized April, 1910, capitalization \$1,500,000, shares \$1 par.

Lands, on Snowstorm mountain, east of Mullan, show 2 veins opened by a shallow shaft and a 130' tunnel, with about 200' of workings. Was developing with a small force, late 1912.

SNOWSTORM EXTENSION COPPER MINING CO.

IDAHO

Mine address: Mullan, Shoshone Co., Idaho. H. H. Lively, superintendent. Organized Oct., 1909, under laws of California, as successor of Snowstorm Extension Mining Co., Ltd., capitalization \$1,000,000.

Lands 9 claims, adjoining the Snowstorm on the east, supposedly carry the extension of the Snowstorm ore zone. Pits and trenches have shown ore of about 3% copper tenor, markedly similar to that of the Snowstorm. Development is by a drift tunnel, starting from North Fork creek, that was 2,000' long Oct., 1913, planned to be driven to secure an eventual back of 1,630', on the dip of the vein. Buildings include bunkhouses.

SNOWSTORM MINING CO.

IDAHO

Office and mine: Larson, Shoshone Co., Idaho. Leo Greenough, pres. and gen. mgr.; J. Brush Greenough, vice-pres.; R. E. Walters, sec.-treas.; preceding officers, J. W. Greenough, J. H. Heward, M. D. Hall and H. E. Chaney, directors; Frederick McCormick, supt.; L. E. Warner, mill supt.; A. Rocca, engr.; F. Hofer, chemist-assayer.

Organized July, 1900, under laws of Idaho, capitalization \$1,500,000, shares \$1 par, nonassessable; fully issued. For fiscal years ending June 30, earnings were \$5,677 net in 1905; \$144,322 in 1906; \$498,013 in 1907; \$243,262

in 1910; \$25,691 in 1911; \$15,787 in 1912; \$141,639 in 1913. Company reported a surplus of \$295,044, June 30, 1909, and \$85,725, June 30, 1913. Dividends were \$90,000 in 1906, \$360,000 in 1907, \$150,000 in 1908, \$202,000 in 1909; \$179,940 in 1910, \$44,985 in 1911, \$74,975 in 1912, and \$142,452 in 1913, a total of \$1,147,147.50 to end of fiscal year, 1913. Shares are listed on the Spokane Stock Exchange. Annual meeting, last Tuesday in July.

Lands, 20 claims, 16 patented, about 400 acres, with a 2-acre mill site, and 300 acres available for tailings in Daisy gulch, 3 miles east of Mullan, in the Hunter district of the Coeur d'Alene region.

The workable ore of the Snowstorm mine occurs in a bed of white quartzite about 40' thick, known as the ledge. The rock is harder and purer than the quartzite above and below it, but there is no definite vein wall. The ledge dips steeply to the S. W. and the mineralization is cut off by a fault zone with a throw of 700' or less. It is not all commercial ore, the ore shoot being 700' long and stopping at the 900' level. If displaced by the fault, the lost ore shoot must lie below the No. 4 tunnel level. The ore consists of quartzite impregnated with minute particles of bornite, chalcocite and chalcopyrite. When rich, it is dark gray, but the leaner ore is dappled, or speckled. The oxidized ore which formed the greater part of the mine output, is greenish brown and stained by limonite. The mine output averages about 2.75% copper with 2 oz. of silver for each percent of copper. The richer ore contains about 5% copper and as it carries 90% silica, it is hard to find a steady market for it, now that converters use basic, instead of silicious lining.

Development is entirely by tunnels, the 2 uppermost now disused, though the lower is connected with the surface by an air shaft. Tunnel No. 4, the lowest, and now the main working tunnel, is 1,600' below the outcrop and 535' below No. 3 tunnel, known as the 1,100' tunnel. The total workings amount to many miles of underground development.

Ore reserves are estimated at about 250,000 tons, including about 70,000 tons of 3.5% ore, blocked out above No. 3 tunnel, other ore averaging between 2 and 2.5% copper.

No. 4 tunnel has a back of about 1,750' on the dip of the vein. At 3,150' from the portal, this tunnel encountered a fault, apparently identical with the fault in No. 3 tunnel. The east drift of No. 4 tunnel is about 1,800' long, practically reaching the boundary line of the Pandora mine and has shown some patches of chalcocite ore, but payable ground has not as yet been developed in this tunnel, and the prospects apparently are not bright. A winze sinking from this level, east of the fault, is expected to pick up a possible extension of the orebody at a depth of about 600'.

The mine is connected with the railway spur at Larson by a 7,300' tram line from No. 2 tunnel, and a 3,000' Riblet aerial tram from No. 3 tunnel.

Electric energy is used throughout, the power installation having two 20-drill air compressors, with direct-connected motors, 3 additional motors and an electric light plant. The company maintains a good system of water works, water being brought through a 4½-mile pipe line, generating 300 h. p.

The new concentration mill, built 1912, of 300 tons rated capacity, has a No. 6 gyratory crusher, 2 Hardinge mills, 2 Richard-Janney classifiers, 14 Wilfley tables, 17 Deister tables, 7 vanners, 3 trains of rolls and Callow tanks. The mill is handling about 230 tons per day and making an extraction of 55 to 60%. Concentrates run about 25% copper and 27 oz. silver per ton. The old leaching mill is dismantled.

Buildings include a 40x50' office, machine shop, smithy, changing house, and a sawmill at the mouth of No. 2 tunnel. There are 2 hotels, with accommodations for 300 workmen, these buildings being 52x84' and 40x200' in

size, the latter having 110 rooms, with hot and co'd water in each, steam heat and electric lights, no mine in the N. W. having superior accommodations for its workmen. About 110 men are employed.

Production, begun 1904, has been decidedly irregular, since the mine is dependent upon outside smelters for the sale of its ores. This has brought about curtailment and suspension of output on numerous occasions, owing to erratic demand, suspensions of smelting, and other causes, over which the Snowstorm Co. had no control. Ores have been shipped, at various times, to almost every copper smelter in the northwestern states and British Columbia, including the Washoe Works at Anaconda, the Butte Reduction Works and the Pittsmont smelter at Butte, the Tacoma smelter in Washington, the Greenwood and Great Falls smelters of British Columbia. Concentrates are shipped to Tacoma.

Production for fiscal years ending June 30, has been as follows:

Year	Ore, tons	Fine copper, lbs.	Silver, oz.
1905		4,950,000	.....
1906		6,233,940	.....
1907	76,224	6,850,000	525,000
1908	87,503	8,000,000	596,000
1909	119,816	10,363,438	734,968
1910	91,368	7,125,105	605,075
1911	34,464	2,653,036	267,263
1912	29,964	2,074,447	204,870
1913		4,522,605	368,906

The cost of finished copper delivered, after deducting silver values, was 10.735 cts. per lb. in the fiscal year, 1913. The property is one of present importance, and should be a considerable producer for some years to come.

SNUG HARBOR COPPER CO.

ALASKA

Office: 821 Marbridge Bldg., New York. Letter unclaimed at former mine office: Valdez, Prince William Sound district, Alaska. Wales J. Watson, pres.; Alfred G. King, vice-pres.; Harry L. Earle, sec.-treas., at last accounts. Organized Feb., 1910, under laws of Arizona, capitalization \$5,000,000, shares \$10 par, fully issued.

Lands, 18 claims, on Snug harbor, Knight's island, presumably held under bond and lease.

Company apparently has done little or no work on the property and because of its careless regard for the truth, shown in the prospectus, is regarded with much suspicion. See Vol. X.

SOMBRERETILLO MINING CO., S. A.

MEXICO

Controlled through stock ownership by the Sonora Central Mines Co.

SOMBRERO DEVELOPMENT CO.

ARIZONA

Office: Houghton National Bank Bldg., Houghton, Mich. Mine office: Globe, Gila Co., Ariz. Dr. Lucius L. Hubbard, gen. mgr.; Clarence A. Botsford, supt. Company is a syndicate, not incorporated. Lands, on Cherry creek, west of Sombrero Butte, and about 50 miles north of Globe, are slightly prospected by adits. The mine has a small water-driven plant. Inactive.

SONORA CENTRAL MINES CO.

MEXICO

Office: 1207 Fort Dearborn Bldg., Chicago, Ill. Mine office: Alamos, Sonora, Mex. Joseph Hodnett, pres.; E. M. Board, vice-pres.; A. L. Kanagy, sec.; Stephen C. Goss, treas.; preceding officers, Henry Pelgrim, D. L. Watson, C. B. Cole, A. P. Ballou, O. R. Barnett, J. E. Randall, Alice M. C. Allen, J. C. Pirkey, Wm. B. Jones, J. W. Snyder and J. B. Arnold, directors.

Organized July 18, 1907, under laws of Arizona, capitalization \$10,000,-

000, shares \$10 par; issued, 775,000 shares. Corporation Trustee & Agency Co., Chicago, registrar. Annual meeting, Sept. 15.

This company was a merger of the controlling interests of the International Copper & Gold Co., Southern Sonora Development Co. and Santa Cruz Mining Co., and is merely a holding company, controlling the corporations named and other subsidiary and collateral corporations. The management reports that this company controls, through ownership of nearly all outstanding stock, the Southern Sonora Development Co., International Copper & Gold Co. and Santa Cruz Mining Co., these subsidiary corporations in turn controlling the San Bernardo Mining Co., Sombretillo Mining Co., S. A., Santa Fe Copper & Gold Mining Co., and the Montana Copper & Gold Co. Inasmuch as the corporate relations between these different subsidiaries are not clearly shown by the official reports of the different companies, it has been deemed best to describe the various properties, no matter how owned or controlled, under this title.

Lands were reported by the company, 1913, to be 3,603 acres, including 140 acres in Montana, 148 pertenencias in Mexico and 3,087 acres of agricultural lands in the Mayo valley, where the management claims that 3 crops can be raised yearly. There are 20 different properties, of which 5 are said to carry copper, 1 lead, 6 silver and 8 gold.

The Santo Domingo group of 21 pertenencias, which is the principal property, is an antigua, lying between the Quintera and Zambona mines, near Alamos, Sonora, Mex. This property shows fissure veins traversing granite and porphyry and occurring along the contact between granite and porphyry, apparently forming an ore zone of about 30' width and 2,000' length, with shoots of payable ore, 6 to 8' wide and 40 to 90' long. The Santo Domingo is said to have an orebody carrying a footwall paystreak of silver-copper glance ore assaying up to 220 oz. silver per metric ton and is said to have 7' of mixed copper and silver ore assaying 17 oz. silver per ton.

Development is by a 360' shaft, with about 3,000' of workings and management estimates reserves above the 3rd level, at 150,000 tons of concentrating ore, carrying values of \$11 to \$25 per ton. The consulting engineer estimates the Santo Domingo ores to average 24 oz. silver per ton. Equipment at this mine includes a 10-stamp mill and small concentrating plant.

The Dolcoath group of 11 pertenencias, at Alamos, is said to show ore assaying 12% copper and about 20 oz. silver per ton. El Sorteo group of 10 pertenencias, 7 miles from San Bernardo, Alamos, Sonora, has a 30' vein, opened by a 300' tunnel, showing ore giving good assays in copper, silver and gold. El Pedregal group of 14 pertenencias, 17 miles from Alamos, has a 200' shaft and a 1,760' tunnel. La Negra group of 4 pertenencias, adjoining El Pedregal, has a 100' shaft, with about 1,500' of workings, and is equipped with a 10-stamp mill. El Nino group of 10 pertenencias, 8 miles east of El Pedregal, and 30 miles south of San Bernardo, has 90' of workings, said to show silver-lead ore. La Josefita group of 14 pertenencias, about 30 miles east of Alamos, has about 100' of workings, said to show copper ore. The Zacatecas group of 10 pertenencias, near the Trigo gold mine, has 50' of workings, said to show gold ore. La Higuera group of 8 pertenencias is said to have a 50' vein, with a 16' paystreak carrying mainly silver values. The Santa Ana group of 4 pertenencias has 50' of workings, said to show silver-lead ore. The San Pablo group of 10 pertenencias, in the Altar district of Sonora, is said to be an antigua, with considerable workings. The Santa Cruz group of 12 pertenencias, includes the Cuiche gold mines, in the Altar district, the Santa Cruz mine having a 380' shaft and 300' tunnel, and

the Cuiche mine having a 60' shaft, the group, as a whole, having about 3,000' of workings, with a 10-stamp mill. La Australia group of 20 pertenencias, in El Fuerte district of Sinaloa, has a 70' shaft, with about 400' of workings, showing a 12' paystreak of ore giving assays up to 15% copper and 112 oz. silver per ton.

The Ruth claim, in Missoula county, Mont., is said to show copper ore, and has 100' of workings. The Stone Creek mines, sometimes known as the Ballarat & Wallede group, area 120 acres, 18 miles from Dillon, Madison county, Mont., have a 300' two-compartment shaft, with 1,370' of workings, and are said to have shipped some ore to Butte smelters returning 17% copper.

The Montana properties have been idle several years, and operations at the Mexican properties have been interrupted by political disturbances since 1911.

SONORA CHIEF MINING CO.

MEXICO

Office: 219 Argyle Bldg., Kansas City, Mo. Mine office: Suaqui de Batuc, Sonora, Mex. Jas. E. Crosby, pres.; Dr. Moses T. Runnels, vice-pres. and treas.; R. A. Bruns, sec.; preceding officers, C. D. Stoll and I. D. Waggener, directors. Organized July 18, 1904, under laws of Arizona, and protocolized, Oct., 1905, under laws of Mexico, capitalization \$1,500,000, shares \$1 par.

Lands are 2 groups, known as the Phoenix and Lakeside, 464 acres, 8 miles south of Suaqui de Batuc. The property shows granite-porphry, diorite and limestone, with several large, continuous orebodies, of which 4, of 5 to 6' average width, carry ores said to give average assays of 15.8% copper, 10 to 80 oz. silver and \$25 to \$49 gold per ton. Development, mainly at the Phoenix group, includes shafts of 95' and 125', and tunnels of 25', 754' and 248', with 4,000' of workings. The company also owns the DeWet and Kruger placer grounds, about 75 acres, on the Yaqui river, with an available waterfall, estimated as capable of generating 440 h. p.

The whole affair was a crooked proposition manipulated by one L. H. Jansen, now deceased, probably in collusion with others. The property has no such showing as reported and described. Such veins as exist are tiny streaks a few inches wide, which in places contained very high-grade ore, chalcocite and perhaps whitneyite. Its location, on the far side of the Yaqui river, is such that even a remarkably good showing would not have been worth development at the time the company was active. The property is totally devoid of merit. Idle several years.

SONORA COPPER MINING CO.

MEXICO

Office: 895 So. Clarkson Ave., Denver, Colo. Edward J. Wilcox, pres.; H. L. Peebles, vice-pres.; Fred W. Webber, sec.; C. A. Parker, treas., and L. J. Stark, directors. Organized May 17, 1910, under laws of Colorado, capitalization \$10,000, shares \$1 par.

Lands, 10 claims, 24 acres, on Laradero creek, 4 miles from San Felipe, in the Arizpe district, Sonora, and 62 miles from Posa on the S. P. R. R.

Property is developed by numerous pits and short tunnels with about 820' of underground workings, showing a 12' vein, with some ore said to average 24% lead, 27% zinc, 4 oz. silver and up to \$2 in gold per ton. The mine has no power equipment nor mine buildings of consequence. Idle since 1912.

SONORA COPPER SMELTING CO.

MEXICO

Office: 424 Scarritt Bldg., Kansas City, Mo. Mine office: Noria, Sonora, Mex. A. M. Conard, pres. and gen. mgr.; J. M. Lowe, vice-pres.; C. E. Kroh, sec.; W. R. Moore, treas.; preceding officers, J. G. Burnley, F. E. Reed, E. E. Axline, J. E. Kramer and Chas. L. Irons, directors. Organized

June 25, 1908, under laws of Arizona, capitalization \$3,000,000, shares \$10 par. Company was supposed to have been organized as successor of the Sonora Copper Co., but apparently owns only a 50% stock interest in that company, and title to the Mexican property is held in the name of the International Copper Ore Corporation, which is controlled, in some manner, by this company, the corporate relations being neither clear nor satisfactory. Annual meeting, third Tuesday in December.

Lands, about 500 acres, with miscellaneous holdings of approximately 8,500 acres of valley land, on both sides of the railway, including the town-site of Noria. The mineral lands, east of Noria, include the Cobre Grande, Creston de Cobre, Veta Grande, Wedge and Extension de la Washington properties. The Cobre Grande, 123 acres, 5 miles east of Noria, is the principal mine. Considerable work has been done on the Extension de la Washington group on a vein said to be of 4 to 97' width, traceable 3 miles on the company's lands, and to carry oxidized ores, succeeded by chalcocite, chrysocolla, tetrahedrite and galena, with some chalcopyrite in the deepest workings. The ore is reported to carry 2 to 40% copper, 5 to 25 oz. silver and \$2.50 to \$30 gold per ton, and claimed to average about 6% copper and \$5 per ton in combined silver and gold values, but the quantity of ore of this grade must be small.

Development is by several shallow shafts with 1 of 260' depth, and by tunnels of 50', 200', 560', 950' and 2,150', the latter, the main working tunnel, cutting the main vein to give a back of 650', and having winzes of 155' and 275'. The property has upwards of 6,000' of workings, estimated by the management to show 140,000 tons of ore, and the company plans continuing development in the sulphide zone.

Equipment said to include a steam plant with three 60-h. p. boilers, 50-h. p. and 100-h. p. engines, 20 and 75-kw. generators, a 4-drill Sullivan air compressor, a 25-h. p. gasoline hoist at No. 2 shaft, and electric hoists of 25 and 30 h. p. at the main tunnel winzes.

A 3,500' Leschen automatic aerial tramway, with drop of 450', connects the portal of the main tunnel with the smelter. A mill may be built later, adjoining the smelter. A 100-ton smelter, built under a 20-year concession granting exemption from state and municipal taxes, has a 44x80" water-jacket blast furnace, to make matte only, three 60-h. p. boilers, 50 and 80-h. p. engines, a Connersville blower, and a 10-kw. electric generator. Water is secured from wells.

Property is not considered worthy of the money spent upon it and the past history of the president is such that the company is regarded with much suspicion.

SONORA DEVELOPMENT CO.

MEXICO

Office: 603 New Ridge Bldg., Kansas City, Mo. Mine office: Moctezuma, Sonora, Mex. Alfred Blaker, pres.; Chas. M. Williams, vice-pres.; Col. Geo. M. Bowie, vice-pres.; John W. Amerman, sec.; W. A. Rule, treas.; preceding officers, R. N. Richmond, A. A. Potter and A. D. Fetterold, directors; E. H. De Vore, cons. engr. Organized under laws of Arizona, capitalization \$1,000,000. Company absorbed the Goodlander Mining & Milling Co.

Lands, 98 hectares, including the Nacozari Copper Queen, Wostenholm, Conformé, Goodlander, Don Genaro y Anexas, Cuauhtemoc and La Verde groups, carrying auriferous and argentiferous copper and lead sulphides. The Nacozari Copper Queen mine, 65 acres, lying between the Pilares de Nacozari and Belle Unión mines of the Moctezuma Copper Co., has given ore assaying up to 58% copper. The property is developed by shafts and tunnels, apparently somewhat at random. The Goodlander has a 10-stamp

mill. The company has been idle for several years and apparently is ready for reorganization.

SONORA EXPLORATION CO.

MEXICO

Mine office: Estación Yzabal, Sonora, Mex. Lands, formerly held by the Florida Copper Co., in the vicinity of the El Tigre mine, include El Temblor, Last Chance, Texas and other properties, carrying gold and silver-copper ore, developed by shaft. Equipment includes steam power and an air compressor. Idle.

SONORA EXPLORATION & METALS CO.

MEXICO

Office: care F. H. Cothren, 2 Rector St., New York. T. B. Johnstone, pres.; A. Oltmann, sec.-treas.; A. A. Leach, Jr., supt. Is a close corporation. Capitalization \$1,500,000.

Lands, 27 pertenencias, 67 acres, known as the Domingo group, lying between the Las Animas and the Nahuila mines, at San Javier.

The property is a gold-silver-copper prospect, said to have ore assaying up to 4% copper, 95 oz. silver and \$20 gold per ton.

SONORA MINING & DEVELOPMENT CO.

MEXICO

Office: 207 Spitzer Bldg., Toledo, Ohio. Works office: Toledo, Sonora, Mex. A. E. Klauser, pres.; H. R. Klauser, vice-pres. and gen. mgr.; H. C. Gerber, sec.-treas.; and A. V. Baumann, directors. Organized 1901, under laws of Arizona, capitalization \$5,000,000, shares \$1 par. Company operates in Mexico under the name of the Yaqui Smelting & Refining Co., S. A., which is organized under the laws of Mexico, capitalization 100,000 pesos. Company is exempt from the payment of property tax for 20 years, and also enjoys a 50% reduction on the state tax for 20 years. International Trust Co., Boston, registrar; Frederick R. Tibbetts, Boston, transfer agent.

Lands are about 154 hectares of mineral property, and about 1,000 acres of miscellaneous lands, including a smelter site and town site. Property is reached by a branch of the Southern Pacific railway, and the company has a government concession for construction of an aerial tram line of 40 kilometers length. Lands are in the Ures, Hermosillo and Sahuaripa districts.

The mineral lands include numerous claims in the municipalities of San Antonio de la Huerta, San Javier and San Onavos, about 80 miles east of Torres and about 60 miles below Campo Santo Niño. The principal property is the Veta Grande mine, about 10 miles from the smelter, said to show a gossan 40' wide, outcropping for a quarter mile. Property also includes the Almeda, Plomosa, Isabella, Moctezuma, San Francisco, Caballos, Ferruginosa, Independencia and Gerberina mines, carrying mainly gold-silver-copper ores, with some auriferous silver-lead ore.

The reduction works include a sampler, smelter and power plant, with necessary adjuncts. The works are on a hillside on the west bank of the Yaqui river, and is the only custom plant in a district rich in mines whose development has been delayed by lack of rail facilities and depredations of the Yaqui Indians. The 50-ton sampling mill is 30x50' in size, 2 stories high, equipped with a 9x12" Blake crusher, 5x8" Allis-Chalmers gyratory crusher, 12x12½" Allis-Chalmers rolls and a 10x12" engine.

The smelter, of 150 tons nominal daily capacity, has a 40x60' blast furnace building, with a 36" circular Allis-Chalmers blast furnace, for use interchangeably on lead and copper ores, and a smaller furnace for copper only. Fuel formerly local coal and coke, both unsatisfactory, is imported coke, available by rail. The reverberatory furnace is 18' 4" x 26' 2" in size. The power plant includes two 80-h. p. water-tube boilers, 2 engines, an Erie high-speed engine being belted to a 25-kw. generator for light and power and a No. 7 Connorsville blower, for furnace blast. The lead refinery building has a softening furnace, refining furnace and 2 desilverizing kettles, operating

on the Parks process. The silver refining plant includes 2 cupel furnaces, with blast attachments, 1 bullion furnace, 1 muffle furnace, and necessary pots and moulds, with a bullion vault.

Buildings at the works include a laboratory, a machine shop, smithy, general store, hotel and an ice plant. Presumably idle.

SONORA-PACIFIC MINING CO.

MEXICO

Mine office: Noria, Sonora, Mex. Ira E. Bowers, general manager. Organized, 1911, as the successor of the Llano Copper Co.

Lands, 10 groups, 526 hectares, on Caracahui mountain, 3 miles east of Noria, the nearest rail point, also 5,000 hectares of ranch lands. Property shows limestone cut by intrusions of diorite and porphyry, with a quartz vein of 3 to 50' estimated width, traceable 6,000' on the company's lands, which is reported to show bunches of ore carrying chalcocite, bornite and chalcopyrite, with a little native copper that will average about 7% copper, 6 to 10 oz. silver and \$2 to \$5 gold per ton, as developed. Development consists of the 105' No. 1 shaft, No. 4 shaft of 800', and No. 7 shaft of 600', with tunnels of 50', 200', 577' and 750'. Orebodies developed so far are too small and too few for commercial production.

Equipment includes a 125-h. p. steam plant, with 7x8" and 8x10" hoists, and a 6-drill Ingersoll-Rand air compressor.

SOUTH BUTTE MINING CO.

MONTANA

Mine address: Butte, Silver Bow Co., Mont. John G. Williams, M. E. Riley and Arthur Howell, directors, at last accounts. Organized May 25, 1906, under laws of Minnesota, capitalization \$500,000, shares \$100 par. This company was organized by the Great Northern railway interests. The company has had much litigation, with various individuals and corporations, including the Butte Central Copper Co., East Butte Mining Co., P. D. Morgan and others, winning practically all of the suits. Property was leased to the Montana Consolidated Mining Co., but nothing of particular value was developed, and the latter-named company was liquidated.

Lands include the Surprise placer claim, but company's chief asset consists of mineral rights to a narrow strip along the Great Northern right-of-way. Idle.

SOUTH FORK & KALISPELL COPPER CO.

MONTANA

Office: Kalispell, Mont. Chris Best, S. M. Logan, William Morris, Mrs. Mary T. Morris, W. Curran, Thos. Lee and W. Howe, incorporators. Organized July, 1913, capitalization \$1,000,000, shares \$1 par.

Lands, 4 claims, 2 patented, in the Silver Basin district, Flathead county, 8 miles from Essex and the Great Northern railroad.

The property, slightly developed, shows ores, said to have given assays of 36% copper, 4.28 oz. silver and up to \$41 gold per ton.

SOUTH HECLA MINING CO.

UTAH

Office: Walker Bank Bldg., Salt Lake City, Utah. Mine office: Alta, Salt Lake Co., Utah. Geo. H. Watson, pres. and gen. mgr.; Herman Bamberger, vice-pres.; H. L. Pratt, sec.-treas.; preceding officers, H. C. Edwards, Theo. Tobiason, E. C. Ashton and L. P. Palmer, directors; Arvi Roininen, mine supt.; Robt. Gorlinski, engr. Organized Sept. 14, 1910, under laws of Utah, capitalization \$500,000, shares \$1 par, assessable; issued \$226,781. Company was organized as a merger of the South Columbus Consolidated Mining Co., and Alta-Hecla Mining Co., and holds properties formerly held by the Bingham-Centennial, Alta-Quincy, Columbus Wedge, Ivanhoe and Lilburn mining companies. Company exchanged stock on the basis of 1 share of South Hecla for 5 shares of South Columbus, and 1 share of South Hecla for 5 shares of Alta-Hecla. Shares are listed on the Salt Lake Stock Exchange. Annual meeting, second Wednesday in September.

Lands, 40 claims, partly patented, and partly with patents applied for, 550 acres, in the Little Cottonwood district. The property carries fissure veins in grano-diorite and limestone, and contact deposits between limestone and granite. The 2 orebodies under development are reported by the management to range from 4' up to 30' in width, and to carry malachite, azurite and tetrahedrite in the surface zone, succeeded by chalcopryrite, galena and sphalerite, estimated by the management to average 3.5% copper and 20 oz. silver per ton.

The mines were operated throughout 1912, but the copper production was small, in fact the total for all the 15 working mines of both the Big and Little Cottonwood districts, coming mostly from the Michigan-Utah holdings, was but 386,963 lbs. copper in 1912, with a total value for lead, silver, gold and copper output of but \$232,381. The property includes a number of old mines, with rather extensive workings, including No. 1 shaft of 100' depth, No. 2 of 112', No. 3 of 160', No. 4 of 90', No. 5 of 125', No. 6 of 110', and No. 7 of 155'. Development is principally by tunnels, as follows: The Dwyer of 2,000', the Alta-Quincy of 1,800', the South Columbus of 1,400', the Rustler of 1,200', the Scott of 1,700', the Neversweat of 150' and the White of 700'. The mine as a whole has about 20,000' of workings, lighted by electricity.

Equipment includes a 60-h. p. electric plant, with a 10-h. p. hoist good for 200' depth, and a 3-drill Ingersoll air compressor. Buildings, partly destroyed by snowslides, 1908-09, have been replaced, and there are now 8 structures, including a 40x130' shop building, housing a machine shop, smithy and carpenter shop, with a 3-story boarding house and 5 dwellings.

SOUTH KEARSARGE MINE.

MICHIGAN

Owned by Osceola Cons. Mining Co., at Calumet, Houghton Co., Mich.

SOUTH LAKE MINING CO.

MICHIGAN

Office: 60 Congress St., Boston, Mass. Mine office: Houghton, Mich. John C. Watson, pres.; Arthur C. Paine, sec.-treas.; R. M. Edwards, gen. mgr.; preceding officers, Ashley Watson and Frederick Hoitt, directors. Organized Feb. 25, 1880, under laws of Michigan, capitalization \$1,000,000, shares \$25 par, as the Aztec Copper Co., and reincorporated Aug. 12, 1909, under present title, with capitalization increased to \$2,500,000, shares \$25 par and corporate existence extended for 30 years from Feb. 25, 1910; issued 67,919 shares, \$6.60 paid in. Last assessment was \$2, payable June 3, 1912. Of the issued stock 20,000 shares were put out at \$2 each Aug., 1909, to shareholders of record pro rata and 10,000 shares were sold May, 1913, to an underwriting syndicate at \$6 net per share. Balance of assets Dec. 31, 1912, were given as \$29,885. American Trust Co., Boston, registrar; Federal Trust Co., Boston, agent. Annual meeting, first Tuesday in March.

Property, 334 acres of mineral lands, being the W. $\frac{1}{2}$ of Sec. 31, T. 51 N., R. 37 W., adjoining the Lake mine on the east, and the Adventure property on the west.

Mining work was begun on the property in 1862, though the name Aztec was originally taken because the remains of extensive workings by a prehistoric race were thought, in those days, to have been the work of the Aztecs. A 16-lb. stone hammer was taken from the old workings. The mine had a stamp mill in early days, and produced 756,853 lbs. fine copper, of which 100 tons was secured in a single mass. Exploratory work was done, 1905-06, on the Knowlton bed, of the Evergreen series, by the Aztec-Algomah Development Co., and diamond-drill borings were begun Sept., 1909, continuing until March, 1911, when suspended by reason of adverse financial conditions. Borings were begun at the base of Evergreen bluff, near the foot of the Evergreen belt, thence working southward toward the

eastern sandstone. Eight drill holes were put down at various points on the property and in addition 4 stand pipe holes were put down to test the depth of the overburden in search of points having a comparatively shallow capping of drift. Stand-pipe work disclosed an overburden of homogeneous clay, of 272' average thickness, in the vicinity of drill holes Nos. 3 and 7, and from the comparative ease with which stand pipes were driven through the overburden, and from the material brought up, it would appear that the overburden of the South Lake, varying from 105 to 300' in thickness, is almost entirely argillaceous and contains very few boulders.

No. 1 hole, driven in the north-central part of the property, was unproductive of results. No. 2 hole, bored close to the eastern, and about 1,000' north of the southern boundary, cut ore matter at depth of a little more than 1,800' in what is supposed to be the Lake amygdaloidal bed, and was bottomed at about 2,400' depth in a conglomerate thought to be identical with that underlying the Lake bed on the Lake property. No. 3 hole cut amygdaloidal beds at 748' and at 878', both beds carrying copper. At still greater depth 2 other amygdaloidal beds, without copper, were penetrated, and the hole penetrated a conglomerate bed at a depth of about 1,300' and was bottomed at 1,953'. No. 4 drill hole cut the first cupriferous bed at depth of 824', the first 16' carrying copper, and at 50' greater depth the second cupriferous bed was cut, this carrying copper for 30'. At depth of about 1,090' this hole cut a third amygdaloidal bed carrying fair copper values for about 20' and hole was stopped at a depth of 1,235'. No. 5 hole yielded results almost identical with those from No. 4, except that the fourth or bottom bed of the cupriferous series carried very little copper. No. 6 hole first cut copper at about 500' depth, in a bed of about 20' thickness, having 5' of extremely rich copper ground, 5' of fair copper ground, and 10' of ground ranging from lean to almost barren.

Holes Nos. 3, 4, 5 and 6 were bored to form a square of about 200', near the eastern boundary, approximately equidistant between the north and south lines of the property. Data from these 4 holes indicate the general strike of the formation to be N. 70° W. at this point, with a dip of about 56° S. This series of holes has disclosed 4 copper-bearing beds, 1 lying immediately above an ophite stratum, and 1 below, with 2 other cupriferous beds at distances of about 30' and 60'. The borings of the South Lake have been carefully correlated with the underground work at the Lake mine adjoining, and with the results of the diamond-drill boring on a number of other properties in the same district.

Dr. Hubbard has held, rightly it proves, that the South Lake carries the western extension of the rich amygdaloidal stratum first opened in the Lake mine. The apparently irreconcilable difference of 70° in the strike of the bed in the Lake mine and the supposedly same bed in the South Lake mine is accounted for by the hypothesis that there is a flexure in the Lake bed and parallel strata, and that the northerly continuation of the Lake series is deflected from a N.-S. strike in the workings of the Lake mine, to a strike of N. 70° W., where cut by drill holes Nos. 3, 4, 5 and 6 on the eastern border of the South Lake tract. A further flexure to the west of this point on the South Lake property would give an ultimate strike parallel with that of the bedded series of the Evergreen belt, shortly to the northward. The correctness of this hypothesis is proven by the western deflection of the Lake bed in the northernmost workings of the Lake mine. The confusing feature of the structure has been the southerly dip of the 4 copper-bearing beds developed by the South Lake drill holes, Nos. 3 to 6, which is opposed at right angles to the northerly dip of the Evergreen lodes a short distance to the north. The detailed structural geology of this section has

yet to be worked out, but it is evident that the South Lake contains the continuation of the rich amygdaloid of the Lake Copper Co.

Ground was broken May, 1912, for a vertical shaft designed to open up the copper-bearing beds disclosed in drill holes Nos. 3, 4, 5, 6, 7 and 8. The shaft has 3 compartments with a concrete collar through the over-burden and was 515' deep at the end of 1913. The first level is at 300' with other levels at 100' intervals. At depths of 110', 145', and 170', the shaft passed through 3 amygdaloidal lodes, 18', 10' and 40' thick, respectively, all of which have been opened in a crosscut on the 300' level. These lodes carry good copper values and presumably are identical with those cut in the No. 1 drill hole between depths of 160 and 254', where all showed copper. These lodes are not to be confounded with the lodes discovered in drill holes No. 3 to 8, which are to be opened by a crosscut in an opposite direction on the 600' level.

The South Lake has installed all machinery necessary to carry on development up to the point of production and has a decidedly promising property upon which to work.

SOUTH LIVE OAK DEVELOPMENT CO.

ARIZONA

Office: 518 Railway Exchange Bldg., Milwaukee, Wis. Mine office: Miami, Gila Co., Ariz. Geo. J. Lonstorf, pres.; L. D. McClure, vice-pres. and gen. mgr.; C. C. Faires, sec.; S. A. Dunn, treas.; preceding officers, P. D. Kennedy and Geo R. Hill, directors; H. E. Dunn, supt. Organized 1912, under laws of Arizona, capitalization \$500,000, shares \$10 par, assessable; issued 10,000 fully paid shares and 30,000 shares, marked \$2.50, paid in. Last assessment was 50 cts., payable Oct. 15, 1912. Shares are listed on the Boston curb.

Lands, 16 claims, 310 acres, held under bond and lease, for \$250,000, payable \$12,500 March 15, 1912, \$25,000 March 15, 1913, and \$25,000 at 3 months intervals thereafter, with final payment of \$137,500 March 15, 1914.

The property, known as the Schulze group, adjoins the Southwestern Miami, and carries the extension of the Miami ore belt on which the Miami, Inspiration Consolidated and Live Oak mines are opened. Property shows Pinal schist capped by granite porphyry, both formations being highly altered and fissured. The mineralized schist, exposed in places, covers about 100 acres on this property. The oxidized zone shows low-grade copper carbonate ore, and ore of commercial grade occurs entirely in secondary form, as chalcocite, in veinlets and coatings on brecciated material.

Development is by churn drilling, a total of 8 holes, having been drilled to end of 1913. The No. 1 hole, located about 3,000' south of the Southwestern Miami boundary line, disclosed a leached and oxidized brecciated granite capping to a depth of 455', below which chalcocite ore of low grade was encountered, ore of commercial tenor appearing at about 490' and continuing to a depth of about 550'. The hole was stopped at a depth of 825'. No. 2 hole, 500' west of No. 1 hole, was started in granite, and abandoned at a depth of 755' without disclosing ore. No. 3 hole, about 200' from the Southwestern Miami boundary, entered mineralized schist at a depth of 610', and ore of about 2% copper tenor at a depth of 750', which continued to 815', where the hole passed into barren ground and was stopped. No. 4 hole, 1,000' west of hole No. 3, showed small amounts of carbonates, and was abandoned at about 850' without developing ore of commercial value. No. 5 hole, 200' west of No. 3, disclosed 90' of ore, reported to have assayed better than 2% copper, and was stopped at a depth of 917'. No. 6 hole, 300' S. W. of hole No. 5, went to a depth of 950', without important developments. No. 7 hole, 300' north of No. 3 hole, was abandoned at a depth of 965' without developing ore. No. 8 hole, 400' west of No. 5 hole, was without

showings of importance to a depth of about 250' when work was suspended, June, 1913, since which time the property has lain idle.

Buildings include an office, boarding house, bunkhouse and several dwellings.

SOUTH MOUNTAIN MINES.

IDAHO

Mine address: Silver City, Owyhee Co., Idaho. Property, about 20 miles south of Silver City, originally worked for its gold-silver-lead ores, in the early 70's, shows a wide contact zone of marbelized limestone, capped by an iron and manganese gossan, traceable several miles, flanked by granodiorite. Ores at and near surface are mainly silver and lead carbonates with occasional gold values, succeeded at comparatively shallow depth by copper-iron sulphides in a silicious gangue, reported to average about 10% copper, 30 oz. silver and \$1.50 gold. The copper sulphides also carry occasional kidneys of clean galena with high values in silver, and there is a pronounced streak of zinc sulphides with very small values in gold and silver.

The mine has an old 50' shaft and a 1,000' tunnel, the former showing a 4' vein of silver-copper ore. Idle several years.

SOUTH RANGE MINING CO.

MICHIGAN

Office: 199 Washington St., Boston, Mass. Mine office: Houghton, Houghton Co., Mich. John W. Belches, pres.; Irving J. Sturgis, vice-pres.; Arthur E. Coe, sec.-treas.; preceding officers, John C. Watson, Horace H. Stevens and Rufus R. Goodell, directors; Fredric W. Nichols, resident agt. Organized Nov. 12, 1899, under laws of Michigan, capitalization \$2,500,000, shares \$25 par, fully paid; issued \$2,370,000. Annual meeting, first Wednesday in June.

Owens 7,000 acres of undeveloped mineral ground, lying mainly between the Globe and Lake mines, in Houghton and Ontonagon counties, Mich., and so effectually scattered that future mining companies acquiring territory in that district will need more or less land from the South Range Mining Co. to secure regular tracts.

SOUTH SAN XAVIER COPPER CO.

ARIZONA

Office and mine: Tucson, Pima Co., Ariz. S. M. Franklin, manager. Lands show a contact deposit between limestone and porphyry, with a gossan cap of 30' estimated width, carrying a 30' paystreak of sulphide ore assaying up to 28% copper and 12 oz. silver per ton. The ore deposit is developed by a 2-compartment shaft of about 200' depth. Smelter shipments have returned 13.5 to 20% copper, with small silver values. Presumably idle.

SOUTH SIDE MINING CO.

MICHIGAN

Office: 60 Congress St., Boston, Mass. John C. Watson, pres.; Arthur C. Paine, sec.-treas.; preceding officers, Harry F. Fay, Ashley Watson and D. C. Forbes, directors. Organized 1868, under laws of Michigan, and reincorporated Nov. 2, 1898, capitalization \$1,000,000, increased, 1911, to \$2,500,000, shares \$25 par; fully issued, \$9.70 paid in. The company levied assessments of about \$90,000, to 1872, and April, 1912, paid a cash dividend of 25 cts per share and 1,935/10,000 of a share of stock of the Naumkeag Copper Co., received in payment for lands sold to that company.

Lands were about 200 acres, lying west of the Dacotah and north of the old Naumkeag properties, immediately west of Houghton, sold, with the exception of about 31 acres of surface rights surrounding the water supply of the village of Houghton, for \$22,515 cash and 7,740 shares of stock of the Naumkeag Copper Co. Negotiations for the sale of remaining surface rights to the village of Houghton are in progress, and when completed, company can be liquidated.

SOUTH UTAH MINES & SMELTERS**UTAH**

Office: 165 Broadway, New York. Mine office: Newhouse, Beaver Co., Utah. Hugo Hoffstaedter, pres.; H. G. Robinson, sec.-treas.; preceding officers, J. F. A. Clark, E. P. Earle and Samuel Newhouse, directors; W. L. Heidenreich, gen. mgr.; R. J. Tullock, mill supt. Organized Feb. 28, 1910, under laws of Maine, as successor of Newhouse Mines & Smelters, capitalization \$4,300,000, shares \$5 par; issued 645,800 shares. Debentures \$1,071,000 of 6% 20-year income bonds, convertible into stock at par, remaining from a \$1,500,000 bond issue put out by the Newhouse Mines & Smelters. Interest on bonds is said to be payable annually, but only if and when earned, and then out of net profits of the year's operations. The old company defaulted in interest on its bonds, and the property was bought for \$500,000 under foreclosure, old shareholders being given stock, share for share, plus a payment of \$1 per share for new stock. The reorganization brought about \$600,000 into the treasury, of which all but about \$200,000 was required to liquidate the floating debt of the old company. The annual report for year ended June 30, 1912, showed an operating loss of \$31,113, increasing a former deficit to \$118,353, and gave current assets as \$179,500 and current liabilities as \$33,723. No report was issued in 1913. Equitable Trust Co., New York, transfer agent; Windsor Trust Co., registrar. Annual meeting, third Monday in October.

A dividend of 50 cts. per share, amounting to \$300,000, paid Aug. 31, 1907, by the Newhouse Mines & Smelters, was termed a first quarterly dividend, but had no successor, there being no profits to divide. Apparently the action of the management in declaring this dividend, and calling it the first quarterly dividend, was for market effect only, and censurable.

Lands, 13 claims, patented, 201 acres, with miscellaneous holdings, including the Midvale placer of 168 acres area, water rights at Wah Wah springs, mill and town sites and grazing lands, giving total holdings of 7,882 acres.

The mineral property carries about 1 mile of the strike of the Cactus vein. The Cactus mine shows monzonite-porphyry country rock, near a limestone contact, and ore is essentially an irregular mass of brecciated monzonite, carrying copper impregnations, including some oxidized ores in the upper workings, but at depth mainly chalcopyrite, associated with pyrite, averaging about 1.15% copper and 25 cts. per ton in combined gold and silver values. Although the average grade of ore is very low, there is some high-grade sulphide ore, mainly chalcopyrite, assaying up to 15 and even 20% copper, but the quantity of such ore is very small.

The mine has practically no ore reserves, though there is an orebody between the 700' and 800' levels containing about 100,000 tons of 1.5% ore, with an additional 100,000 tons of probable ore. A new orebody opened on the 600' level for a short distance shows ore averaging about 1.8% copper.

The mine is developed by two 3-compartment working shafts, of 600' and 900' depth, with levels at 100' intervals, and connected on the 600' level with a 6,300' main haulage tunnel, having a grade of 5%, laid with 30-lb. steel rails. Trammings is done by 2 electric locomotives, each hauling trains of 21 cars. The tunnel is electric-lighted throughout, and cuts several cupriferous veins before reaching the main orebody. The mine has upwards of 4 miles of workings. Principal developments are between the 300' and 700' levels, and the 600' level, giving the principal showing of ore, was said Aug., 1912, to have an orebody of 135' width and about 125' length, carrying ore of a little better than 1% copper. The mine had some trouble, 1908, from caving and the management has since operated the mine on the caving system.

At the portal of the main tunnel the ore trains pass to an ore house,

where 7 cars at a time are run into a great steel tube, which is partially rotated, and the ore dumped from the cars upon grizzlies, oversize going to Blake crushers that reduce it to lumps of 1" size and smaller, fines and crushed ore going to 800-ton storage bins, whence the ore is loaded into railroad cars, and taken to the mill.

The mine has a 200-h. p. steam plant, with a 150-h. p. hoist good for 600', and a 40-drill Ingersoll-Sergeant air compressor, both operated electrically. There also is an auxiliary electric hoist on the second level.

The mine and mill are connected by the Newhouse, Copper Gulch & Sevier Lake railroad, 2.3 miles in length, of standard gauge, owned by the company, which connects with the San Pedro & Salt Lake railway, equipment including a Shay mountain-climbing locomotive and five 50-ton dump cars.

The 1,000-ton mill is 100x400' in size, in two 500-ton duplicate sections, designed on the unit plan, to allow for future expansion. The western section, which is the concentrator proper, is of structural steel, with corrugated iron sides and roof, having a 15-ton Whiting traveling crane, while the power plant, under the same roof, is of structural steel and brick. Equipment includes three 10x24" Blake crushers, 4 sets of rolls, 1 Huntington mill, 22 Hartz jigs, 48 Wilfley tables, 10 Johnston tables, 8 Wilfley slimers, 16 Callow tanks and Sherman settling tanks and classifiers. Ore is received in 1,000-ton steel bins, whence it is drawn by belt conveyors, equipped with plunger feed, and transferred to elevators, of which there are 2 for each section, 1 for dry and 1 for wet ore. The mill was overhauled and practically rebuilt 1910, at a cost of about \$70,000, going into commission Sept., 1910, after which it was claimed to have been so improved that it was extracting 75% of the assay values as compared with the former average extraction of about 50%. Concentration is about 12.5 into 1. The mill was reported Aug., 1913, to be treating between 200 and 300 tons of ore daily with an extraction of 65% of assay values, and concentrates were said, Sept., 1912, to average about 7.9% copper. The mill product is sent under a 5-year contract calling for 1,000 tons of concentrates monthly, to the Tooele smelter of the International Smelting & Refining Co. Concentrates formerly were reported to carry 10 to 25% excess of iron, commanding a premium of about 10 cts. per unit.

The power plant includes five 350-h. p. Babcock & Wilcox boilers, a Green fuel economizer and a 165' steel smokestack of 8' diameter. The steam plant is held in reserve, machinery being actuated by electric energy, brought 50 miles over the lines of the Telluride Power Co. There are two 500-h. p. Westinghouse-Parsons turbines, making 3,600 r.p.m., formerly direct-connected to two 400-kw. generators that furnished all power, except compressed air, used in the mine and mill.

Water is brought 8½ miles from 6 large springs, at Wah Wah, through a line of 12" and 14" riveted steel pipe, laid across Preuss valley, discharging into a cement reservoir of 300,000 gals. capacity, located on high ground above the mill and town site, the springs having a flow of about 1,000 gals. per minute.

The buildings of the company include a machine shop, carpenter shop, smithy, sawmill and a 3-ton ice plant, the latter being necessary in summer, as the property is on the edge of the Escalante desert.

A town site called Newhouse has been platted near the mill, and the company owns therein 47 dwellings, a club house and a brick hotel with accommodations for 150 men.

Production for the fiscal years ending June 30 was 5,670,993 lbs. fine copper, 53,862 oz. silver and 2,272 oz. gold in 1906; 7,244,179 lbs. copper,

48,595 oz. silver and 1,721 oz. gold in 1908; and for the period Sept. 1, 1910, to June 30, 1912, was 5,527,810 lbs. copper, 43,691 oz. silver and 2,450 oz. gold, secured from 426,703 tons of ore, of which 701 tons were smelting ore and 34,062 tons of concentrates, giving an actual net extraction of about 13 lbs. fine copper, 6 cts. silver and 11 cts. gold per ton. Production for calendar years was 2,590,230 lbs. in 1911, 2,071,544 lbs. in 1912, and 1,151,476 lbs. for 6 months ending Sept. 30, 1913. Mining costs have been estimated at 90 cts. and milling costs at 50 cts. per ton, and while the margin of profit, after allowance for smelting costs is exceedingly small on 12-ct. copper, it is very satisfactory on 16-ct. copper. It is obvious that the Cactus is an exceedingly low-grade mine and will require careful handling to earn any profits.

SOUTH YUBA MINING & SMELTING CO. CALIFORNIA

Mine office: French Corral, Nevada Co., Cal. Al. Elliger, pres.; C. D. Tregonning, supt. Capitalization \$50,000.

Lands, 10 claims, in process of patenting, including the Red Ledge mine, 10 miles N. W. of Nevada City, the nearest rail point. The property shows granodiorite and diabase. There are 3 known veins, mainly copper-bearing, and 1 vein, originally worked for its gold ores, carries considerable quantities of this metal in the copper zone below.

Development is by 6 tunnels, longest 330', with total openings of about 2,000', showing malachite, chalcopyrite and good values in gold and silver. Principal tunnel, starting just above the South Yuba river, is expected to intersect 3 veins, including a 35' vein of cupriferous hematite, and give a back of about 1,500'.

Equipment includes a 10-stamp mill, cyanide plant and water power. Was developing with small force at last accounts.

SOUTHERN ARIZONA MINING CO. ARIZONA

Office: 303 Midland Bldg., Kansas City, Mo. C. A. Pierce, superintendent, Patagonia, Santa Cruz Co., Ariz. Property, the Sweet group, showing gold-bearing copper ore. Mine employs about 20 men and has shaft equipped with steam hoist and Rand air compressor.

SOUTHERN ARIZONA SMELTING CO. ARIZONA

Office: 11 Pine St., New York. Works office: Silver Bell, Pima Co., Ariz. E. B. Gage, pres.; W. F. Staunton, vice-pres. and gen. mgr.; A. N. Gage, sec.-treas.; preceding officers, Selwyn Eddy, V. L. Mason, F. M. Murphy and H. M. Robinson, directors; Meade Goodlow, supt. Organized Aug. 10, 1906, under laws of Arizona, capitalization \$1,500,000, shares \$100 par. Is a subsidiary of the Imperial Copper Co.

Lands, 8 miles south of Red Rock and 12 miles from the Imperial mine, with a down-grade haul, include the 110-acre town site of Sasco, with 400 lots, each 50x150'.

The reduction plant, known as the Sasco smelter, includes a sampling mill, blast-furnace building, converter building, power house, boiler house, machine shop and smithy, all of steel frames, with dwellings, a store, office and miscellaneous buildings. All of the principal buildings are planned so that they can be extended in 2 directions, giving an almost unlimited capacity for expansion. The smelter, blown in Feb. 1, 1908, and blown out Aug., 1910, did a general custom business, but treated mainly ore from the Imperial mine. The plant is of about 750 tons nominal daily capacity.

The sampling mill is small, but fully equipped. Ore is received from the mines in 50-ton steel-bottom dump cars, discharging into 4,000-ton storage bins.

The cupola building has two 300-ton blast furnaces, 1 of which, under pressure, has given an actual duty of nearly or quite 400 tons daily. Charg-

ing is from cars hauled by locomotives on tracks of 36" gauge. The settlers are elliptical, slags, which are of low copper tenor, skimming into 10-ton slag trucks, hauled by steam locomotives on a standard-gauge track. The 100x350' dust chamber leads to a 175' stack of 12' diameter.

The converter department has a 50-ton electric traveling crane, of 45' span. There are six 84x126" shells, rotated hydraulically, and hoods from the converter stands lead to an independent dust chamber and stack. Product is blister copper, averaging 99.3% copper, with small quantities of silver and gold.

The power plant has an electric traveling crane and a 650-kw. electric installation with 440-volt induction motors. There are 2 Nordberg Corliss condensing engines, direct-connected to No. 9 Connorsville blowers, and a Nordberg cross-compound Corliss condensing air compressor having 15" and 30" steam cylinders, with two 36" air cylinders and 42" stroke. The boiler house has 4 Morrison marine boilers. Water is secured from wells in the Santa Cruz valley, by an 8" pipe line. Entire plant cost \$500,000. For production, see Imperial Copper Co.

SOUTHERN EXPLORATION & MINING CO. COLORADO

F. B. Goudy, business manager, 2379 Forest St., Denver, Colo. H. P. King, superintendent, Red Mountain, Ouray Co., Colo. Property, the Congress mine, which shows a vein of copper-lead ore that is developed by a 400' shaft with extensive workings. Equipment includes electric driven compressor.

SOUTHERN PACIFIC GOLD & COPPER M. & M. CO. UTAH

Office: 39 North Capitol Ave., Salt Lake City, Utah. Mine near Ogden, Weber Co., Utah. T. S. Freaney, pres.; Wm. Pough, vice-pres.; J. W. Burnham, sec. and gen. mgr. Organized July 20, 1903, under laws of Utah capitalization \$1,000,000, shares \$1 par, assessable; issued \$798,910. Shares are listed on the Salt Lake Stock Exchange.

Lands, 12 claims, unpatented, 240 acres, 3 miles from a railway and about 8 miles north of Ogden, in the Sierra Madre district, reported to carry 25 orebodies, mainly contact deposits between quartzite and gneiss. The main vein, of about 50' width, shows some oxidized ores, but mainly auriferous sulphides, including covellite, bornite and chalcopyrite, with some molybdenite, in a 6' vein. Development is by a 65' incline shaft on the Wizard claim, showing a 2' vein of high-grade copper ore and 8 tunnels, longest about 440', with about 700' of workings, at last accounts, said to show ore assaying up to 6% copper, 37 oz. silver and \$1.60 gold per ton. Presumably idle.

SOUTHERN SONORA DEVELOPMENT CO. MEXICO

Office: 1207 Fort Dearborn Bldg., Chicago, Ill. Property near Alamos, Sonora, Mex. E. M. Board, pres.; A. P. Ballou, vice-pres.; A. L. Kanagy, sec.; Stephen C. Goss, treas.; F. B. Smith and Jas. Hodnett, directors. Organized July 1, 1904, under laws of Arizona, capitalization \$1,000,000, shares \$1 par. Is controlled by the Sonora Central Mines Co., and in turn controls the San Bernardo Mining Co. Property described under Sonora Central Mines Co.

SOUTHERN SULPHUR ORE CO. ALABAMA

Mine at Pyriton, Clay Co., Ala. W. T. Williams, superintendent, at last accounts. Property is a mine carrying cupriferous and slightly auriferous and argentiferous iron pyrites. Equipment includes a steam plant. Idle.

SOUTHERN SWANSEA MINING CO. UTAH

Office: 408 South State St., Salt Lake City, Utah. Mine office: Silver City, Juab Co., Utah. Geo. Jones, pres.; A. T. Sanford, vice-pres.; Richard B. Shepard, sec.-treas.; E. R. Higginson, supt. Organized 1906, under laws

of Utah, capitalization \$10,000, shares 1 ct. par. Shares are listed on the Salt Lake Stock Exchange.

Lands, 4 claims, unpatented, 80 acres, south of the Swansea mine and supposed to carry an extension of the Swansea vein, showing porphyry, quartzite and lime, with a fissure vein of 12' estimated average width, traceable 1 mile, carrying auriferous and argentiferous oxidized and sulphide ores of copper and lead, developed by a 200' shaft.

SOUTHWESTERN COPPER CO.

ARIZONA

See Arizona-Southwestern Copper Co.

SOUTHWESTERN MIAMI DEVELOPMENT CO.

ARIZONA

Office: 85 Devonshire St., Boston, Mass. Mine office: Globe, Ariz. Geo. F. Ruez, pres.; R. T. McKeever, vice-pres.; Robt. H. Gross, sec.-treas.; preceding officers, Thos. S. Dee, D. T. Kennedy, H. B. Hovland and Geo. J. Maas, directors; F. W. Hoar, gen. mgr.; E. R. Rice, mg. engr.; Philip Maverick, chemist-assayer. Organized June 24, 1911, under laws of Arizona, capitalization \$250,000, increased Feb., 1912, to \$500,000, shares \$5 par; issued 15,000 fully paid shares and 85,000 assessable shares, \$2 paid in. Last assessment was \$1, payable Jan. 15, 1912. The first annual report as of date Dec. 31, 1912, gave receipts since organization as \$276,084 and disbursements as \$197,162, of which \$65,944 was payments on options, leaving a balance of \$78,922. Shares are listed on the Boston curb. Boston Safe Deposit & Trust Co., registrar.

Lands, 35 acres, owned in fee, and 226 acres, held under options, lying next west and south of the Inspiration Consolidated holdings, in the Miami district, 8 miles west of Globe.

The property shows silicified schist, mineralized at and near the contact with granite-porphyry, the orebody being an extension of the porphyry deposit opened in the Inspiration and Miami properties. Ore occurs as chalcocite disseminated in schist.

Development is by churn drilling, along the same lines followed by its big neighbors, Miami and Inspiration. Up to end of Oct., 1913, 17 holes had been drilled, those completed averaging about 1,200' deep and the total footage amounting to about 20,000. Ore developed in this manner was estimated by Mr. Hoar, Feb., 1913, at about 1,500,000 tons of 1.5% copper, on which a recovery of about 65% is expected. Mr. Hoar also estimates mining costs at \$1.15, milling costs at 65 cts. per ton, and cost of smelting, etc., at about 3 cts. per lb.

Development work to prove the extension of the orebody continues without interruption and in Nov., 1913, hole No. 15 was 1,155' deep, and No. 16 was 787' deep, both holes in silicified schist, while No. 17 was 449' deep. Property considered promising and management excellent.

SOUTHWORTH CONSOLIDATED MINING & MILLING CO. UTAH

Office and mine: Farmington, Davis Co., Utah. J. D. Wood, pres.; J. H. Robinson, vice-pres.; J. H. Wilcox, sec.-treas.; preceding officers, David Hess and W. Crawford Anderson, directors; W. J. Huselton, gen. mgr. Capitalization \$30,000, shares 10 cts. par. Property has a copper deposit, with quartzite hanging and gneiss footwall, developed by a 345' tunnel, showing a 40" vein carrying ore said to average 1.5% copper, 3% lead, 2.5 oz. silver and \$2 gold per ton. Idle several years.

SPECIE PAYMENT MINE.

COLORADO

John Owen, manager, Idaho Springs, Clear Creek Co., Colo. Property shows a vein with gold-silver-copper ore, developed by a 2,500' tunnel. Equipment includes electric driven air compressor and a 20-stamp mill. Was formerly owned by Specie Payment Gold Mining Co., described Vol. X.

SPECULATOR MINE.

See North Butte Mining Co.

MONTANA**SPECULATOR MINING CO.****MONTANA**

Office: Butte, Mont. Mine office: Clinton, Missoula Co., Mont. John A. Creighton, pres.; John Dougherty, vice-pres. and gen. mgr. Property, near Clinton, includes the Black Hawk group, developed through the Cape Nome shaft, which this company sunk 200' to the 500' level. The company was said 1909, to have bonded the Aladdin mine, near Clinton. Company formerly owned the Speculator mine at Butte, sold 1905 to the North Butte Mining Co. Presumably idle. Former holdings, now owned by the North Butte, were fully described Vol. V.

Office and mine: Kerby, Josephine Co., Ore. Dr. Jas. Spence, gen. **SPENCE & CO.** **OREGON**

mgr.; C. W. Spence, supt. Lands, 11 claims, 220 acres, 40 miles from a railroad, show diorite and porphyry, carrying 4 veins, under development, estimated at 4 to 100' width, opened by 7 tunnels, aggregating 1,500'. Ores carry cuprite, melaconite, malachite, azurite and chalcopryrite, mainly the latter, giving assays of 3 to 20% copper, 1 to 6 oz. silver and \$1 to \$10 gold per ton. The Edelweiss claim shows some native copper ore with fair gold values. The property has been under development with a small force for several years.

SPENCE MINERAL CO.**CALIFORNIA**

Office: 1061 Mills Bldg., San Francisco, Cal. Mine near Spenceville, Nevada Co., Cal. D. M. Kent, secretary. Property is an old mine, operated 1875-1903, the shaft caving in the latter year. Company acquired property in 1897. Ore contains auriferous and argentiferous chalcopryrite, associated with pyrite and ranges from 2 to 20% copper, but averaging 5%, and 45 to 50% sulphur. The ore occurs in irregular fissure veins 15 to 50' wide that lie near the contact of diorite and granodiorite. The mine has yielded over 12,000,000 lbs. fine copper and owing to the large orebodies and good average values in copper, gold and silver, as well as to the good sulphur values, would seem worthy of further development. There is a leaching plant at San Francisco. Idle.

SPENCER MOUNTAIN TUNNEL CO.**COLORADO**

Office: Boulder, Colo. Mine office: Eldora, Boulder Co., Colo. Wm. B. Allbright, pres.; J. A. Gilfillan, vice-pres. and gen. mgr.; W. B. Hayes, sec.-treas.; preceding officers, J. T. Odell, Geo. F. Randolph and Chas. Mackey, directors. Organized Feb., 1906, under laws of Colorado, capitalization \$1,250,000, shares \$1 par, nonassessable, in \$250,000 preferred and \$1,000,000 common stock; issued \$1,088,000.

Lands, 8 fractional claims, 25 acres, besides 2 mill sites and a 10-acre dumping site, in the Grand Island district. The property carries a network of fissure veins in gneiss, 12 of which are of 1 to 10' estimated average width, and are more or less developed. The ores carry sylvanite, petzite and a copper telluride, Rickardite, first discovered on this property. Ore is estimated by the management to average about 10% copper, with traces of silver, and \$5 to \$50,000 gold per ton. Development includes shafts of 110', 60', 40' and 25' and 90', but is mainly by a 6,000' drainage and transportation tunnel, the mine having about 7,000' of workings.

Equipment includes 100-h. p. steam plant, with a 5-drill air compressor, and there are 3 buildings. Idle since 1907.

SPITZEE MINING CO., LTD.**BRITISH COLUMBIA**

Mine office: Rossland, Yale district, B. C. Organized 1905, under laws of British Columbia, as a reconstruction of Spitzee Gold Mines, Ltd., capitalization \$350,000, shares \$5 par. Lands, 110 claims, about 5,500 acres. The

mine produced to Sept., 1905, about 5,000 tons of ore averaging about \$12 per ton in values, and was said to have about 30,000 tons of ore in sight. Property was bonded 1907, to Le Roi Mining Co., Ltd., and a little diamond drilling was done, but mine has been idle since.

SPOKANE TUNNEL MINE. IDAHO

Mine on Placer Creek, north of Wallace, Idaho, is opened by a 1,100' tunnel, showing a 15' vein of black copper sulphides.

SPRAGUE COPPER CO. WASHINGTON

L. K. Armstrong, manager, care Northwest Mining Review, Spokane, Wash. Mine near Chewelah, Stevens Co., Wash. Property, the Matterhorn group of claims, showing a 3' vein with a paystreak of gold and silver-bearing copper ores. Development by tunnel and shaft work aggregates 500'. Plans installation of power plant and compressor, 1914.

SPRINGFIELD GOLD & COPPER MINING CO., LTD. IDAHO

Office: 720 Bank St., Wallace, Idaho. Letter unclaimed at former mine office, Mullan, Shoshone Co., Idaho. O. E. Anderson, pres. and gen. mgr.; E. Hedin, vice-pres.; Mrs. Tillie Zeitfuchs, sec.-treas.; preceding officers, A. H. Featherstone, Christ Anderson, Frank Hess and Christopher Grossbusch, directors. Capitalization \$100,000, shares 10 cts. par, assessable. Lands, 4 claims, patented, 80 acres, well timbered, adjoining the Park and Champion mines, at the head of Champion creek, on Stevens peak, in the St. Joe district, 7 miles south of Mullan. The mine has 2 tunnels, the upper showing chalcopryite ore assaying up to 33% copper, with good gold values, and the lower, a 1,935' crosscut, showing, at 1,800' from the portal, a vein assaying 15.3% copper.

SPRINGFIELD-MEXICAN MINING CO. MEXICO

Office: 213½ South Sixth St., Springfield, Ill. Mine office: Unión de Tula, Jalisco, Mex. Geo. F. Stericker, pres.; Geo. M. Morgan, vice-pres.; Harvey C. McCann, sec.; Samuel S. McElvain, treas.; preceding officers, Geo. R. Brown, Dr. Jas. W. McElvain, Robt. Johns, A. F. Maurer, A. C. Brown, Geo. Hoffman and Robt. L. Perkins, directors; Gerald G. Hereford, supt. Organized June 3, 1903, under laws of Arizona, capitalization \$500,000, shares \$1 par, nonassessable. Annual meeting, third Tuesday in May.

Lands, 25 hectares, 6 miles south of Ayutla and 40 miles from the Mexican Central railway, include the Concepcion mine, an antigua, closed 1821 and reopened 1901. The property shows fissure veins in porphyry, those under development estimated to average 5' wide, traceable a mile with ores carrying malachite, azurite, bornite and chalcopryite that average 5% copper and 10 oz. silver per ton. The mine has 6 shafts, including 3 of 270', 80' and 60' and 7 tunnels, longest 375', with about 1,600' of workings, estimated by the management to show 30,000 tons of ore with 15,000 tons blocked out for stoping.

Equipment includes a 90-h. p. steam plant with a 12-h. p. hoist and 5 mine buildings. Idle on account of revolutionary disturbances.

SPRUCE MOUNTAIN COPPER CO. NEVADA

Mine office: Sprucemont, via Jasper, Elko Co., Nev. Lands, adjoining the Latham mine, about 50 miles south of Wells and 15 miles west of Mizpah, carry copper and lead ores in replacement deposits in limestone cut by rhyolite. The mine has steam power. Presumably idle.

SQUARE DEAL MINING & DEVELOPMENT CO. COLORADO

Office: Winnebago, Ill. Mine office: Frisco, Summit Co., Colo. A. T. Roberts, pres.; J. C. McEvoy, first vice-pres.; J. E. Compton, second vice-pres.; Geo. F. Bunn, treas.; H. G. Allen, sec.; Edw. Huter, mgr., at last accounts. The mine carries auriferous and argentiferous lead and copper ores, and is equipped with electric power and air compressor. The company

advertised, May, 1907, that an investor could not gamble on the Square Deal Mining & Development Co.'s stock, and it seems that this statement was correct, though perhaps not in the sense meant to be inferred, as the company is in debt. Idle since 1909, and apparently defunct.

STANDARD CHEWELAH MINING CO.**WASHINGTON**

Mine office: Chewelah, Stevens Co., Wash. F. R. Clark, president and general manager. Mine is opened by 2 shafts, deepest 200', showing a vein carrying streaks of silver-copper ore. Equipment includes a steam plant with hoist and a 5-drill air compressor.

STANDARD COPPER CO.**NEVADA**

Address: Buckskin, Douglas Co., Nev. Capitalization \$5,000,000, shares \$1 par. Company owns, or did own, a lease on the lands of the Kennedy Consolidated Gold Mining & Milling Co., but is said to be in a bad way financially, and is not favorably regarded.

STANDARD COPPER MINES CO.**ALASKA**

Idle. Office: 68 Williams St., New York. Mine office: Landlock, S. E. Alaska. Morris B. Mead, pres.; John L. Steele, vice-pres. and engr.; E. F. Bourke, sec.; J. O. Molander, treas.; Jas. A. Bourke, gen. mgr.; preceding officers, Thos. R. Manley and Chas. Williams, directors. Organized Feb. 2, 1906, under laws of New Jersey, capitalization \$300,000, shares \$100 par; issued \$220,000. Bonds, \$300,000 issued. Is operated as a close corporation. Annual meeting, third Saturday in December.

Lands, 13 claims, at Thorn Arm, on Landlock bay, in the Prince William Sound district. The lands, which are very precipitous, show country rock of greenstone, reported to carry 17 fissure veins, of which 4, under development, carry lenticular shoots of ore estimated to average 6% copper, 1 oz. silver and 90 cts. gold per ton. Development is by a shaft and tunnels of 260', 80' and 460', with about 3,000' of workings, estimated 1908, to show 20,000 tons of ore with 12,000 tons blocked out for stoping.

The mine is connected with 500-ton ore bunkers on a wharf at tide-water by a 3,300' aerial tram, in 2 sections, 1 of 912' and 1 of 2,526' length.

STANDARD COPPER MINING CO.**MONTANA**

Office: care of A. M. Stevens, Higgins Blk., Missoula, Mont. Organized 1907, under laws of Montana, capitalization \$1,000,000, shares \$1 par. No trace of operations securable, and company apparently never did any work, with a small force at last accounts.

STANDARD COPPER MINING CO.**WYOMING**

Office: 1217 Nicholas Bldg., Toledo, Ohio. Mine office: Encampment, Carbon Co., Wyo. Geo. P. Waldorf, pres.; Alphonse Mennell, vice-pres.; Jos. M. Spencer, sec.-treas.; Chas. E. Winter, managing director; preceding officers, Fred O. Paddock, Harvey M. Cook, John H. Lloyd, John D. Dorn and John A. Scott, directors; O. B. Cothorn, supt. Organized Aug., 1903, under laws of Wyoming, capitalization \$1,500,000, shares \$1 par.

Lands, 15 claims, patented, 300 acres, including the Cothorn group of 5 claims, and the Susquehanna group of 6 claims, about one-half mile east of the Itmay mine. Claims carry contact and fissure veins of 10' estimated average width, with 1 vein, of 40' claimed width, developed by pits and shafts of 10 to 200' depth, showing azurite, malachite, chalcocite, bornite and chalcopyrite, giving assays up to 18% copper and \$2 gold per ton, with small silver values. Equipment includes a 120-h. p. steam plant, with hoist good for 500', a 3-drill Norwalk air compressor, and 5 mine buildings. Property was idle from Dec. 15, 1905, until Aug., 1910, but was developing

STANDARD COPPER PYRITES CO.**ALABAMA**

Office: 1309 Brown-Marx Bldg., Birmingham, Ala. Mine office: Pyriton, Clay Co., Ala. Robt. Ross Zell, pres.; J. C. Clark, vice-pres.; G. John-

son, treas.; J. D. Stagg, sec. Capitalization \$50,000. Lands show a large body of cupriferous pyrite, giving assays up to 6% copper and 42 to 46% sulphur. It is probable that copper values will decrease at slight depth, as they have done in other pyritic deposits in the southern states, but the property seems valuable for its sulphur ores alone.

STANDARD DEVELOPMENT CO. COLORADO & CALIFORNIA

Letter unclaimed at former office: 84 Van Buren St., Chicago, Ill. Mine office: Redding, Shasta Co., Cal. J. M. Dearing, pres.; C. F. Taylor, vice-pres.; John E. Windsor, sec.; Geo. Lill, treas.; preceding officers, Julius C. Pruter, Wm. W. Lill, Simon P. Donnelly, Wm. E. Cloyes and C. M. Harlan, directors. Organized under laws of Arizona, capitalization \$10,000,000, shares \$1 par. Company controlled, through stock ownership, the Grand Republic Copper Mining Co. and Mt. Zirkel Copper Mining Co., of Pearl, Larimer Co., Colo., both dead, and the Pend d'Oreille Mining, Milling & Development Co., of Idaho, title to properties of which are in litigation. Lands are the Jennie "group" of 20 acres on the McCloud river, Shasta Co., Cal.

STANDARD MINES CO. CALIFORNIA

Mine address: Cima, San Bernardino Co., Cal. John W. Kemp, pres.; Frank S. Adams, sec., and R. R. Patterson, directors. Lands, 11 full and several fractional claims, 10 miles north of Cima, having a 356' shaft, with about 2,000' of workings, showing carbonate ores near surface, with melaconite and sulphide copper ores on the 100' level. Idle since about 1907. No new information secured.

STANDARD MINING CO. CALIFORNIA

R. D. Staley, superintendent, Kimberly, Shasta Co., Cal. Property, the Uncle Sam group, shows a deposit of gold-copper ore developed by a 525' shaft and a 1,230' tunnel. Employs 15 men at mine and in the 10-stamp mill. Equipment includes electric power and air compressor.

STANLEY MINES CO. COLORADO

Office: 305 Colorado Bldg., Denver, Colo. Mine office: Idaho Springs, Clear Creek Co., Colo. The late Col. Arthur G. Brownlee was pres. and gen. mgr.; Henry J. Wolf, supt., at last accounts. Organized 1906, as successor of the Consolidated Stanley Mining & Milling Co. Lands, about 90 claims, showing gold and silver-bearing lead and copper ores. Has steam and water power. The reduction plant has 10 stamps, and a tube mill.

STARLESS MINE. UTAH

Office: care Col. Enos A. Wall, owner, Salt Lake City, Utah. Mine office: Bingham Canyon, Utah.

Lands, 8 claims, patented, 160 acres, lying just N. E. of the holdings of the Utah Copper Co. The Starless is developed by an incline shaft and numerous tunnels, longest 2,000', with crosscuts and upraises, aggregating 10,000'. Development said to block out 800,000 tons of 1 to 2% copper ore. Equipment includes a hoist.

The 125-ton mill, enlarged and remodeled 1910, at a cost of \$50,000, is equipped throughout with machinery of Col. Wall's own design, comprising Wall corrugated rolls, Wall steel rolls for middlings, 3 sets of jigs, 2 tables for concentrates, 2 Wilfley tables, and washers, of trough form, with valves and sprayers, concentrates being discharged through the bottom and sands from the top.

STAUFFER CHEMICAL CO. CALIFORNIA

Office: San Francisco, Cal. Mine offices: Kennett, Shasta Co., Cal., and Oakland, Alameda Co., Cal. Chas. E. Kunze, mgr.; Geo. F. Graves, supt.

The Alma mine, 80 acres, in the outskirts of Oakland, has 600' of tun-

nels, developing a lens of cupriferous pyrite, between serpentine and metamorphosed Tertiary cherty rocks. The ore zone is about 3,000' long and the ore contains 3.5% copper, up to 50% sulphur, and up to \$2.50 gold per ton.

The Shasta county lands consist of 30 claims, unpatented, including the Summit mine and the Graves and North Mammoth groups, on the eastern slope of Bohematosh mountain, between the north and south forks of Little Backbone creek, adjoining the Mammoth mine on the N. W. The Summit mine is owned outright, having been bought from the Phoenix Securities Co. for \$80,000. It is developed by 3 tunnels, with about a quarter-mile of workings, No. 2, the main tunnel, of about 400' length, showing a vein of 35' estimated width, carrying sulphide ore assaying up to 14.5% copper. The 400' No. 3 tunnel follows a rhyolite and porphyry contact. Equipment includes a 4-drill air compressor.

Company also held the Tarantula group under bond, the claims lying west of Iron Mountain and having a deposit of gold ore, equipped with a 10-stamp mill.

STEAMBOAT MINING & MILLING CO.

COLORADO

Mine office: Steamboat Springs, Routt Co., Colo. Lands, in the Copper Ridge district, 9 miles N. W. of the D. N. W. & P. R. R., show a 30' vein, carrying a narrow paystreak of high-grade gold-bearing copper ore. Idle.

STEECE COPPER CO.

CALIFORNIA

Mine office: Calzona, San Bernardino Co., Cal. H. E. Steece, president and general manager. Lands, adjoining the Calzona Mines Co., about 2 miles west of the Colorado river, carry auriferous copper ore. The mine has a 700' shaft and 400' tunnel, with about 5,000' of workings, blocking out some ore. Company was working a force of about 20 men, and preparing to make shipments, at last reports. Equipment includes a 15-h. p. gasoline hoist.

STEIN COPPER CO.

ARIZONA

Mine near Kirkland, Yavapai Co., Ariz. B. L. Wolcott, superintendent. Owns sundry claims, known as the Vesuvius group, in the Zonia district, south of Prescott, developed by shaft, showing gold-copper ore of good grade. Equipment includes a 30-ton leaching plant.

STEMP SPRINGS COAL & POWER CO.

WYOMING

Office: 55 High St., Oshkosh, Wis. Mine near Copperton, Carbon Co., Wyo. E. E. Meeleus, pres.; Henry L. Larsen, vice-pres.; H. O. Granberg, sec.-treas. and gen. mgr.; preceding officers, J. S. Armstrong and Fred W. Heddle, directors; Henry C. Beeler, cons. engr.; John F. Binger, mine supt., at last accounts. Organized Nov. 21, 1905, under laws of Wyoming, capitalization \$250,000, shares \$1 par, nonassessable; issued, \$237,976.

Lands, 6 claims, patented, 120 acres, including a smelter site, with 640 acres of coal lands additional, in the Battle Lake district. The copper property shows an 11' vein between quartzite and diorite, traceable 3,000', with occasional stringers of 3 to 12" width carrying chalcopyrite assaying about 12% copper, with small quantities of nickel and cobalt and traces of gold and silver.

Development is by a 200' incline shaft, a 273' tunnel and various prospect pits. The coal lands are reported to carry 3 beds of coal of 3 to 6' thickness. A 15' waterfall is held under a 20-year lease, with privilege of renewal from the Jackpot Mining Co.

Equipment includes a 40-h. p. steam plant at the mine, with a 3-drill Ingersoll-Sergeant air compressor. Buildings include a machine and carpenter shop and smithy.

The smelter, 20 miles from a railway, has a 60-ton McDougall hot-blast furnace, planned to turn out either 50 to 60% matte, or 80% pimple metal, with a 100-h. p. steam plant. Idle.

STEPTOE VALLEY SMELTING & MINING CO.

NEVADA

Office: 165 Broadway, New York. Works office: McGill, White Pine Co., Nev. Silas W. Eccles, pres.; Cornelius B. Lakenan, gen. mgr.; Geo. F. Waddell, mill supt.; S. Severin Sørensen, smelter supt. Organized Jan., 1907, under laws of Maine, capitalization \$10,000,000. Is the smelting subsidiary of the Nevada Consolidated Copper Co. Lands and improvements cost \$8,-452,363.78 to Dec. 31, 1912.

Lands cover 8 square miles, with water rights, the company having with wise foresight secured a large tract in order to prevent damage suits from agriculturists, because of smelter fumes. The property is on the eastern side of Steptoe valley, on the slope at the foot of the Schell Creek range, 14 miles N. E. of Ely and 22 miles from the mines, on the line of the Nevada Northern railway. The smelter site proper comprises 320 acres, 1 mile long and one-half mile wide, on a hillside with 10% grade, permitting the works to be terraced, and handling material by gravity throughout. Lands carry water rights to Duck creek, and to the McGill ranch, estimated as capable, jointly, of furnishing water for a 25,000-ton plant.

The reduction plant is one of the largest and best in existence. The present average capacity is 12,000 tons daily, but the plant is so designed that it can be increased easily to a much greater capacity. All main buildings are of steel frame and the plant is built on the unit system, with allowance for expansion.

The ore bins of timber, about 800' long, are in four 6,000 ton units. Ore is drawn from the bottoms of the bins by belt conveyors which carry it over automatic weighing machines and thence to distributing bins of 40 ton capacity, located at the head of each section of the mill.

The mill, nearly a mile from the smelter, is 378x756' in size. There are 8 sections treating a total of nearly 11,000 tons of ore daily in Dec., 1912. Each section can be operated independently, but the plant is run in 4 units of 2 sections each.

The mill handles a moderately hard silicified altered porphyry ore containing tiny specks of chalcocite, pyrite and some chalcopryrite and averaging 1.3% copper. This is concentrated 25 into 1, with a recovery of about 70% of the assay value, the product containing 18% copper.

The ore treatment is as follows: From the distributing bin ore passes through a belt-driven feeder to a set of 36x15" rolls set for one-half-inch product and run dry, water being introduced underneath, washing the product to a pair of bucket elevators having 8x8x18" buckets. These elevators deliver to 2 trommels 42" diam.x8' long, having 1 section each of 3/16" and 5/16" perforations, the oversize of 5/16" returning to a second set of rolls. 36x14", which deliver to the same elevators. The undersize of 5/16" returns to a third set of rolls, 36x14", also delivering to the same elevators. The undersize of 3/16" passes to eight 2-mm. trommels, 36" diam.x8' long. The oversize of 2mm. passes to a fourth set of rolls 36x15", set to produce a 2-mm. product and delivering to the same elevators as the preceding rolls.

The undersize of the 2-mm. trommels passes to 4 Yeatman hydraulic classifiers designed and made at the plant, each one delivering 5 spigot products and an overflow, each separate class of spigots feeding a separate group of Wilfley tables. The first spigot product goes to 10 Wilfleys, making finished concentrate, middlings, which are treated on 2 Wilfleys following, the reject of which is reground. The second spigot product is also treated on a group of 10 Wilfleys, making finished concentrate, middlings

and tailings to waste. The third spigot product is similarly treated on another group of 8 tables, making products the same as those of the preceding group. Middlings from these 2 groups, together with all reject from the 2 tables treating middlings, also tailings from first group of Wilfleys, are reground in two 6-ft. Chilian mills. Several sections are fitted with 2 sets of 36x15" rigid rolls for this purpose, all reducing through .029" slot mesh wire screen.

The product of regrinders is elevated by a pair of 8x8x18" belt elevators to 4 classifiers of the same type as the preceding, but making 4 spigot products and an overflow. The first spigot product is screened through a pair of trommels 36" diam.x8' long, with same screen as used on Chilean mills, as a guard against accidental leakage or breakage of screens on the latter. The oversize of these returns to the mills. The undersize joins the product of the second spigot and is treated on 10 Wilfleys making a finished concentrate, a middling and a tailing to waste. The product of the third spigot is joined with that of the fourth spigot of the primary classifiers and is treated on another group of 10 Wilfleys, making products similar to the preceding group. The product of the fourth spigot is joined by that of the fifth spigot of the primary classifiers and is treated on a group of 20 Wilfleys making a finished concentrate, middlings and tailings which are retreated.

The middlings of the first 2 groups of 10 tables each following the regrinders, are retreated together on 4 Wilfleys. All middling of the group of 20 Wilfleys following the regrinders, is treated on a group of 12 six-foot vanners. All tailing of the group of 20 Wilfleys following the regrinders is treated on a group of 16 six-foot vanners. All classifier overflows are treated on a group of 16 six-foot vanners. All feed to concentrating machines following the regrinders, is dewatered by cone tanks or by "Dorr" thickeners.

Experiments are being carried on with canvas belt and other machines to effect a saving of the values carried in the overflows of the cone and other settling tanks.

Automatic samplers are used to determine the grade of all material leaving the mill. All concentrates are sluiced to steel tanks having a capacity of approximately 225 tons, dried by suction through a filter bottom, and loaded by means of a Blaisdell disc excavator, into cars running on a track underneath.

Water is secured from Duck creek, which has an average flow of 8,000 gals., per minute, water being collected in the hills in reservoirs and brought by gravity for 9 miles through a 32" iron-banded wooden pipe line and delivered at the highest point of the works under a pressure of 10 to 20 lbs. per sq. in. An electrically-driven pumping plant in Steptoe valley, immediately below the works, has a capacity of about 4,000 gals. per minute. By means of a system of settling tanks, ponds and pumps, approximately 10,000 gals. of water per minute is recovered from mill tailings for re-use. Approximately 4½ tons of fresh water to 1 of ore are used in the process.

The smelter is about one-half mile from the concentrator, and is connected therewith by a standard-gauge railway line. The works have about 12 miles of railway track, equipped with 8 small locomotives, a switch engine and 50 cars.

The smelter includes separate buildings for calcining, reverberatory smelting, blast-furnace smelting and conversion, all of steel frame, with corrugated iron sheathing. Each department has independent flues and chimneys.

The roaster building, 228' in length, has 4 floors, with sixteen 18' six-

hearth McDougal roasters, set in 2 rows. Concentrates are delivered to the calcining building in 8-ton standard-gauge cars, entering over a trestle built of timbers, the feed floor being on a level with the railway trestle. All the roasters have air-cooled rabbling arms, and center columns supplied with air under a pressure of about $3\frac{1}{2}$ " of water by a National Blower Co.'s fan of about 22,000 cu. ft. capacity. The roasters are driven by 30-h. p. electric motors. Hot calcines, carrying 7.5 to 10% sulphur, are discharged into hoppers beneath the roasters and trammed directly to the reverberatories, or to nine 150-ton calcine storage bins, built of brick and steel, which serve as a balance-wheel between the roasting and smelting departments. Each roaster discharges gases through two 32" elbows to a brick flue running between the 2 rows. This flue discharges fumes into the main flue, which is in 2 parts, each of 312' square cross-section, permitting either to be cut out for cleaning. The flue is 1,070' long, including the dust chamber which is 150x50x30', and leads to a brick stack 250' high and of 18' internal diameter at the top. Dust from the flue in the roaster building is piped to the ground floor, for loading into cars, and for about 500' the flue has tracks underneath, permitting the collection of dust from steel hoppers in cars, which are hauled by small locomotives.

The reverberatory building has five 400-ton furnaces, each 19' wide x 111' to 130' long, fired with California crude oil, atomized by air at 40-oz. pressure from a Connersville blower and fed through 7 burners per furnace. From 300 to 500 bbls. of oil per day are used by each furnace, varying with the nature of the charge smelted. Each furnace is connected with two 400-h. p. boilers arranged in parallel, instead of tandem, in the flue between the furnace and the dust chamber. These boilers develop about 100% of their nominal rated capacity under oil firing. Each furnace has bypasses with dampers giving a direct passage for the gases from furnace to dust chamber, when boilers have to be cut out. The equivalent of about 40% of the fuel value of the oil used in the furnaces, is recovered as steam by these boilers. As the gross oil used per ton of charge is about 0.90 bbl., the net, after deducting these waste heat credits, is about 0.52 bbls. per ton of charge.

The reverberatory furnaces are charged with calcines mixed with limestone, dumped through slide gates, from hoppers suspended from the charge floor. Each furnace has 2 tap holes on one side, from one of which matte is drawn off into matte cars of about 10-ton capacity. These cars are tilted and contents poured into the converters by stationary hydraulic apparatus. Slag is skimmed twice every shift, the skimmings going to a cast-iron box leading to a lined launder, in which a jet of water granulates the slag and washes it to the dump. Slags carry 40 to 45% silica, 6 to 12% calcium oxide, 40 to 30% iron oxide and 4 to 6% alumina. The reverberatory building has a dust chamber of 1,000' square section, 155' long, leading to a 300' brick chimney, 15' in diameter at top.

The blast-furnace building, located between the reverberatory and converter departments, has a single blast furnace, 42x240" at the tuyeres, and 84x240" at the shaft, with a capacity of 300 to 500 tons of charge per day, the furnace being so planned that it can be enlarged if desired to 80' in length. The furnace is 13' above the ground level, with a height of 16' from the tuyeres to the charging floor, operating with a 10' column charge and 40-oz. blast pressure. There are 4 steel water jackets on each side, and 1 at each end, and each side has 24 four-inch tuyeres, 10" apart, receiving blast from a 30" bustle pipe. The water jackets each have separate blast boxes and independent air and water connections, so that any jacket may be removed by breaking 3 simple connections. Charging is done by cars

dumped pneumatically, matte is tapped into ladles on cars and slags granulated and sluiced, as in the reverberatory building. Fumes discharge through a 108" downtake to a 12x15x250' brick flue, terminating in the main roaster flue. The blast furnace is not in operation.

The converter building is about 600' from the reverberatory furnaces, and receives molten matte from cars, behind and above the converters, the contents being poured into a launder, while the shells remain in position for blast. The building has two 5-motor Shaw electric cranes, each with a hoist capacity of 60 tons besides 2 auxiliaries of 25 tons each. There are 3 of the old stalls with 96x150" shells of the barrel type built for acid linings, but now used with magnesite brick linings. There are also 2 Pierce-Smith barrel-type converters both originally 25' 10" long by 10' diameter shell. One of these was lengthened at the smelter to 33' 11". They originally had 30 tuyeres each but these have been increased to 47 and 46 respectively. The blast pressure used is nominally 15 lb. gauge at an altitude of 6,327'. The Pierce-Smith converters produce about 60 and 50 tons of copper per day on 40% matte.

Blister copper is poured into ladles and transferred into a brick-lined steel cylindrical receiver. This is mounted on rollers and rotated on its own axis by an electrical motor, so that the molten blister copper is poured through a tilting pouring spoon into moulds on a horizontal straight-line chain and sprocket conveyor. These moulds discharge on a submerged apron conveyor which after traveling in the water horizontally for a few feet turns on an incline and raises the copper ingots out of the water and lands them on the loading platform. They contain 99.5% copper, weigh about 350 lbs. and after trimming and being weighed on accurate scales, they are shipped in box cars.

The converter's slag is taken back to the reverberatory furnaces in 10-ton side-tilting pots operated by compressed air. Flux for the converters consists of concentrator slimes and a silicious carbonate ore from the Copper Flat pit, mixed and dried in an oil-fired rotary drier at the converter building. It is at present being handled and charged by boats but will later be dropped direct from hoppers over each converter. The hoods from the converters lead to a balloon flue running along over the charge floor for the extent of the converter building covered by stalls. It is then connected by a circular flue 10' diam. to a brick dust chamber which in turn connects to a brick stack 100' from the ground, 10' diam. at top.

The power plant has 4 batteries of two 400-h. p. Babcock & Wilcox water-tube boilers each. Two batteries have Foster and 2 others have Babcock & Wilcox internal superheaters and there is a separate Foster superheater for the steam supplied by the reverberatory waste heat boiler plant of ten 400-h. p. boilers. Steam is generated at 150-lbs. pressure and can be superheated 100°F. Some of the boilers are fired by hand and others by power-driven underfeed stokers. Coal is brought in 1,200-lb. buckets by an overhead crawl from the coal pile outside. Each double battery of boilers has a 9x40' steel stack with induced draught, furnished by 2 Sturtevant fans, each connected to a 30-h. p. Sturtevant slide-valve engine, running at 150 to 175 r. p. m. Forced draught is also provided by a National Blower Co.'s fan belt driven from a 50-h. p. motor in the engine room.

Each battery of boilers is equipped with fuel economizers of about 3,360 sq. ft. heating surface, set between the boilers and the induced draught fan; they are dampered so that they can be cut out for cleaning while the boilers are in service.

The engine-room, main floor, contains the generating engines, blowers, 3 exciters and a switchboard, and the basement contains condensers, air

pumps and oil filters. The electrical equipment consists of two 1,100-h. p. 22x48x48" Allis-Chalmers Corliss cross-compound engines, with 800-kw. Bullock a. c. generators mounted on the shafts, and two 2,000-h. p. 31x66x48" Nordberg Corliss cross-compound engines with 1,500-kw. Bullock a. c. generators mounted on the shafts. Current is generated at 600 volts and carried to a concrete transformer station, equipped with four 200-kw. Bullock water-cooled transformers, stepping the current up to 40,000 volts, for transmission to the mines; four 750-kw. Westinghouse water-cooled transformers, stepping current up to 13,200 volts for transmission to the mills; 13,000 and 40,000-volt choke coils and lightning arresters.

The smelter blast plant, in the engine house, includes a 350-h. p. 14x28 x36" Nordberg tandem-compound engine direct-connected to a No. 10 Connersville blower with capacity of 300 cu. ft. of air per revolution, making 120 r. p. m. This is for the blast furnace. For the converters air is supplied at 15-lbs. gauge pressure by 1 Allis-Chalmers blowing engine, 16" and 24" diam. steam, 34" and 34" diam. air by 48" stroke of 6,000 cu. ft. capacity, 1 Nordberg 25" and 54" diam. steam, 52" and 52" diam. air by 48" stroke of 12,000 cu. ft. capacity, and 1 Nordberg 26" and 56" diam. steam, 54" and 54" diam. air by 48" stroke of 18,000 cu. ft. capacity. These are all of the cross compound steam, tandem, air and steam type.

A Laidlaw-Dunn-Gordon cross-compound air compressor with steam cylinders 11" and 21" diameter and air 21" and 12" diameter and 18" stroke of 1,080 cu. ft. displacement, compresses air to 100-lbs. gauge. This was originally for tamping converter linings but is now used for pneumatic tools of various kinds at the shops and the mill.

In connection with the works are a number of thoroughly appointed shops, including a boiler, machine and carpenter shop, foundry, warehouse and roundhouse.

The Steptoe works were started in April and the finished copper shipped in Aug., 1908. Nearly 1,500 men are employed at the plant.

STERLING COPPER CO.

ARIZONA

Office: care Judson A. Elliott, Pasadena, Cal. Lands, in the vicinity of Dos Cabezas, Cochise county, Ariz., are developed by a short tunnel, following a limestone porphyry contact, showing copper ore.

STEVENS COPPER CO.

ARIZONA

Office: Bridgeport, Conn. Mine office: Clifton, Greenlee Co., Ariz. Henry Setzer, pres.; Chas. D. Hawley, vice-pres.; Fred Enos, sec.; Frederic S. Hunt, treas.; Isaac N. Stevens, mgr.; Chas. E. Stevens, supt., at last accounts. Lands, 39 claims, 780 acres, about 2 miles from Metcalf, Ariz., show granite overlaid by Cambrian quartzite and Silurian limestone, with much faulting and intrusive porphyritic dikes, with orebodies near the fault lines. The mine shipped a little ore of 12 to 30% copper tenor to the Shannon smelter, early 1906. Equipment includes a small steam plant. Idle some years, except for annual assessment work.

STODDARD MINES CO.

ARIZONA

Office: 225 Fifth Ave., New York. Mine office: Stoddard, Yavapai Co., Ariz. W. H. Reynolds, pres.; Hon. Isaac T. Stoddard, vice-pres.; C. M. Stoddard, sec.-treas.; J. S. Murphy, gen. mgr. Organized Jan., 1906, under laws of Arizona, as successor of Stoddard Copper Co., capitalization \$100,000, shares \$1 par; fully issued. Annual meeting, in January.

Property, 6 claims, patented, 105 acres, known as the Binghamton mine, some distance from a railway, shows fissure veins in schist, opened by a 500' tunnel and shafts of 600' and 190', with about 4,000' of workings. Mine was discovered 1882, and reopened June, 1906, by present company.

Equipment includes a 50-h. p. steam plant with 2 hoists, a 2-drill air

compressor and 6 mine buildings. Was developing a large body of sulphide ore and shipping, at last accounts.

STONY PASS MINING CO.**COLORADO**

Office: Marrs Hill, Me. W. S. Brown, secretary. Property consists of the Mammoth tunnel and sundry patented mineral claims, held under lease, near Silver City, Can Juan Co., Colo.

The Mammoth tunnel, 2,209' in length, was driven for the purpose of draining and developing the Prospect Basin group and surrounding claims, and at 6,927' from the portal is expected to make connections with the Hercules shaft. The tunnel, when completed will pass under the Henrietta mine workings.

The mineral lands of the company carry silver, lead, copper and manganese ores. Idle several years.

STOWELL MINE.**CALIFORNIA**

Is under bond and lease for \$75,000 to the United States Smelting, Refining & Mining Co. Robt. E. Hanley, superintendent, Kimberly, Cal. Property contains a deposit of gold-silver-copper ore, under development. About 50 men are employed.

STRATTON GOLD & COPPER MINING CO.**COLORADO**

Idle. Office: Salida, Colo. Mine office: Turret, Chaffee Co., Colo. R. F. Stratton, pres.; F. S. Green, vice-pres.; Dr. J. F. Roe, sec.; Geo. Sullivan, treas.; preceding officers and W. E. Stratton, directors. Organized Aug. 24, 1909, under laws of Colorado, capitalization \$500,000, as a reconstruction of the Stratton Gold & Copper Mining & Milling Co., part of the property of which was set aside under title of Hecla-Granite Mining Co. Lands, 11 claims, 220 acres, in the Badger Creek district of Fremont county, Colo. Development, at last accounts, was by a 1,400' crosscut tunnel, with a back of 900', showing bunches of high-grade copper ore.

STRONG COPPER MINING CO.**WYOMING**

Office: 210 Grant Ave., Laramie, Wyo. Mine office: Leslie, Albany Co., Wyo. N. E. Corthell, pres.; M. E. Stickney, sec.-treas.; E. P. Baker, supt., at last accounts. Organized Jan. 17, 1903, under laws of Wyoming, capitalization \$1,000,000, shares \$1 par; issued, \$837,959. Annual meeting, first Wednesday in January.

Property, 16 claims, unpatented, 260 acres, about 14 miles N. E. of Laramie, is reported to show a fissure vein in pegmatite, which perhaps is a pegmatite dike, and contact deposits between limestone and granite. The contact deposit of 7' estimated average width, shows ore carrying malachite, chalcocite, bornite, chalcopyrite, galena and wulfenite, reported to assay 4% copper, 5 oz. silver and \$3.60 gold per ton, with some lead and molybdenum.

Development includes about 20 shallow pits, a 360' shaft and a 450' tunnel, with about 1,300' of workings. Management estimates 10,000 tons of ore on the 250' level, the vein carrying 2 to 7' of concentrating ore, with occasional paystreaks of ore of smelting grade.

Equipment consists of an 80-h. p. steam plant, with a 25-h. p. hoist and 3-drill Nordberg air compressor. Idle except for annual assessment work.

SUCCESS MINING CO.**ARIZONA**

Mine office: Quartzite, Yuma Co., Ariz. Chas. Eichelberger manager. Property, 6 claims, 120 acres, formerly owned by the Success Copper Mining Co., in the Plomosa district. The mine, formerly called the Apache Chief, was opened 1863, and shipped some ore via the Colorado river. The property is said to show sedimentary rocks with intrusive porphyry and hornblende andesite. The orebodies occur along igneous contacts and in

fissure veins. The 2 thus far developed are said to be 12' thick and to yield high-grade copper ore when sorted.

Development consists of about 1,700' of underground work, all done by the former company, including a 300' tunnel, a 250' shaft and 4 shallow prospect shafts. A little copper glance is reported in the deep workings, the other ore is oxidized.

Equipment includes a steam plant. The company shipped several carloads of high-grade argentiferous chalcocite to El Paso smelter, ore being hauled by wagons to Vicksburg, some 150 tons, shipped in 1911, netting about \$2 per ton.

SUCCESS MINING CO.

COLORADO

Mine office: Alma, Park Co., Colo. Jas. Moynahan, manager. Owns the Orphan Boy group, said to carry gold-copper and zinc sulphides, developed by a 450' tunnel. Equipment includes a small steam plant, and 2 small air compressors. Mine was under development, with a small force, at last accounts.

SUISUN CLAIM.

MEXICO

Located about 3½ miles west of Cananea, Sonora, Mex. Col J. B. Breathitt, owner, Tucson, Ariz. Lands, 40 pertenencias, about 100 acres, slightly developed, carry numerous veins in diorite porphyry and limestone. Ores carry gold, silver and copper values.

SULLIVAN DEVELOPMENT CO.

ARIZONA

Office: care P. H. Nelson, pres.; Lonsdale Bldg., Duluth, Minn. Mine office: Paradise, Cochise Co., Ariz. E. B. Hawkins, vice-pres. and gen. mgr.; Geo. H. Crosby, sec.-treas. Lands, 37 claims, partly patented, including the Sullivan, Copperopolis and Horace Mountain groups. The Sullivan group, 7 claims, 4 miles west of San Simon, has opencuts, showing leached copper ore and a little very rich ore, and has a 60' tunnel showing lead ore. The Copperopolis group, 8 claims, near the Sullivan, is slightly developed. The Horace Mountain group of 18 claims has a 300' tunnel. Litigation over the Sullivan group was settled in the company's favor, 1908. Management considered good and property promising. Idle, except for annual assessment work.

SULPHIDE COPPER CO.

COLORADO

Idle. Office: P. O. Box 358, Denver, Colo. Letter unclaimed at former mine office, Crested Butte, Gunnison Co., Colo. J. C. Lewis, pres.; Frank Jérôme, vice-pres.; Geo. S. Ryan, sec.; Geo. N. Wheeler, treas.; Horace Miller, mgr., at last accounts. Lands, in the Rock Creek district, have 75' and 170' tunnels, in argentiferous copper ore. Closed down many years, and apparently hopeless.

SULPHUR MINING & RAILROAD CO.

VIRGINIA

Office: 11 S. 12th St., Richmond, Va. P. H. Haskell, superintendent, Mineral, Louisa Co., Va. Property, a pyrite mine whose ore carries low copper values. Has 600' shaft with steam power, compressor, etc. Ore handled in 500-ton concentration mill. Company makes cement copper from its mine and seepage waters, but is primarily a producer of pyrite for sulphuric acid plants. Is controlled by Virginia Carolina Chemical Co.

SULTANA-ARIZONA COPPER CO.

ARIZONA

See Kelvin-Sultana Copper Co.

SUMMIT COPPER CO.

ARIZONA

Office: 710 Lonsdale Bldg., Duluth, Minn. Wm. A. Eaton, pres.; A. O. Rabideau, sec.; H. L. Palmer, treas. Organized June 22, 1910, under laws of Minnesota, capitalization \$600,000, shares \$1 par, nonassessable; issued, \$570,000.

Balance sheet to Jan. 31, 1912, shows as follows: Receipts—Sale of

stock, \$163,780.00; ore sales, \$28,534.77; bills payable, \$23,000.00; interest and exchange, \$150.65; insurance refunds, \$330.12; miscellaneous refunds, \$73.90; total, \$215,869.44. Expenditures—Mine office expenditures, \$141,333.82; payments on property, \$45,891.34; Duluth office and general expenses, \$5,611.32; interest on Gibson bonds, \$540.00; legal expenses, \$3,146.49; royalties and commissions, \$17,660.53; exchange, \$2.00; Summit Gold Mining Co., \$1,600.00; cash on hand, \$83.94; total, \$215,869.44.

Property was the Gibson copper mine, near Miami, held under lease and bond for a year or more, but surrendered Jan., 1912, after about \$215,869 had been spent deepening shaft 329' and opening up 4,000' of new drifts, etc. The company has now turned to gold mining in Montana, reorganizing as the Summit Gold Mining Co. Shares of the old company are transferable into stock of the Summit Gold Mining Co. (which see) on the basis of 5 old shares for 2 new shares, and a right to subscribe for 1 new share at 40 cts. for each 3 old shares held.

SUMMIT GOLD MINING CO.

MONTANA

Office: 709 Lonsdale Bldg., Duluth, Minn. Mine office: Radersburg, Broadwater Co., Mont. W. A. Eaton, pres.; T. M. B. Hicks, vice-pres.; A. O. Rabideau, sec.; H. L. Palmer, treas.; T. W. Parker, supt. Organized Jan. 22, 1912, under laws of Minnesota, capitalization \$400,000, shares \$1 par, nonassessable; issued, \$300,000. Annual meeting, third Tuesday in January. Company is virtually successor of Summit Copper Co., shares of which are convertible into stock of this company at the ratio of 2½ old shares for 1 new share.

Lands, 8 claims, about 150 acres, including the Blue Bell, 1905, Iowa, Crown Point, Bull Moose, Keywest, Bull Mountain and Lone Tree claims, in the Cedar Plain district, 4 miles S. W. of Radersburg, held under bond and lease.

The property shows 5 fissure veins in diorite, 2 of which have been prospected and are now under development. The Keystone vein trends N. 48° W. and dips 86° N. E., varying in width from 3" to 5'. This vein has been opened by a 139' shaft with 3 levels, extending 305' south and about 100' north, exposing an ore shoot 400' long of solid iron pyrite, carrying gold, an old stope above the 3rd level yielding oxidized ore assaying \$19 to \$65 per ton. There is also a 1,014' tunnel on this vein, connecting with a new working shaft 350' from the portal, and at a depth of 100' in the shaft. This shaft is to be deepened to 400' and at 110' shows a 12' vein of sulphide ore carrying \$8 to \$76 gold, about 2 oz. silver per ton and from trace up to 7% copper, in the form of bornite. The Keywest vein, approximately parallel to the Keystone and of nearly vertical dip, has been developed by shafts of 110' and 64' and a tunnel 160' long at last reports. A development shaft on the Crown Point vein, 750' N. E. of the Keystone shaft, was planned early 1913. No work of importance has been done on this vein in the past, but assays from shallow pits and workings have returned 6 to 7% copper and the usual gold values.

Equipment includes an electric hoist, good for 600' depth, and a 3-drill air compressor. Power is obtained from the Missouri River Power Co.

The property is an old one, and was worked for its oxidized gold ores to a depth of about 100'. The new owners plan to sink shafts to a depth of about 500', before attempting further lateral work, and to develop the sulphide ores occurring at depth. Property considered promising.

SUMPTER SMELTER.

OREGON

See Northwest Smelting & Refining Co., at Sumpter, Baker Co., Ore.

SUNNYSIDE MINES.

COLORADO

Owned by Wm. L. and Jos. T. Terry and Ellen Terry-Strong; Wm. L.

Terry, superintendent, Eureka, San Juan Co., Colo. Property shows a deposit of complex silver-lead-copper-zinc ore, developed by 400' shaft and 200' tunnel. Equipment includes electric power, air compressor, a 150-ton concentrator with 40 stamps and tube mills and a new electrostatic Huff zinc separating plant.

SUNRISE MINING CO.

CALIFORNIA

Mine office: Genesee, Plumas Co., Cal. W. S. Mason, pres., sec. and gen. mgr.; L. B. Hogan, treas., and J. C. Cross, directors. Organized Nov., 1910, under laws of Arizona, capitalization \$1,000,000, shares \$1 par, non-assessable; issued, \$400,000.

Property, 4 claims, unpatented, 75 acres, 21 miles from nearest point on Western Pacific railroad, shows 3 fissure veins in schist near a porphyry contact, estimated to average 3 to 5' in width; 2 orebodies seen in pits of 14' and 25' show copper oxides and carbonates and chalcopryite ore, estimated by the management to average 3% copper, 5 oz. silver and \$2.10 gold per ton. Mine has no power equipment, but there are several buildings. Idle and property for sale.

SUNSET COPPER CO.

NEW MEXICO

Office: Hachita, N. M. L. M. Stiles, pres. and mgr.; W. P. Stiles, vice-pres.; S. F. Johnson, sec.; L. B. Wilcox, treas. Property includes the old King mine, 7 miles N. W. of Hachita, which has a 150' shaft with workings on a vein showing gold-silver-copper ores. Property is a prospect.

SUNSET MINING & DEVELOPMENT CO.

NEVADA

Office: 265 Russ Bldg., San Francisco, Cal. Mine office: Rhyolite, Nye Co., Nev. Company is a silver producer, incorporated Dec. 9, 1912, under laws of Nevada, as a reorganization of the Tramps Consolidated Mining Co., Bullfrog Sunset Mining Co. and Denver Bullfrog Annex Mining Co. Capitalization \$5,000,000, shares \$1 par; issued, \$2,063,357. Balance sheet April 26, 1913, shows cash, \$14,212; accounts receivable, \$5,516.

SUNSET MINING & DEVELOPMENT CO.

WASHINGTON

Mine office: Northport, Stevens Co., Wash. H. W. Working, president and general manager. Lands carry gold and silver-copper ore, developed by a 400' main shaft, with about 1,400' of workings. Diamond-drill borings 1910, from the 400' level, showed 5 veins of 14", 18", 30", 4' and 4' estimated average widths, in a distance of 350', carrying chalcopryite, associated with pyrrhotite. Equipment includes steam power, with hoist and air compressor. No returns secured for 1912-13.

SUNSET MINING & MILLING CO.

ARIZONA

Idle. Office: 1427 Majestic Bldg., Detroit, Mich. Mine address: Dos Cabezas, Cochise Co., Ariz. Eugene F. Bradt, pres.; C. Wm. Beck, vice-pres.; Frank A. Rasch, sec.; Hon. Carl Franke, treas.; preceding officers, Frederick C. Deinzer, Oscar B. Marx, Geo. A. Greening, Chas. A. Maurer and Frederick Knorr, directors. Organized July 15, 1904, under laws of Arizona, capitalization \$1,000,000, shares \$1 par, nonassessable, in \$350,000 preferred and \$650,000 common stock, of which \$25,632 of preferred and \$618,484 of common stock were issued, Feb. 6, 1911. Annual meeting, first Tuesday after first Wednesday in January.

Lands, 8 claims, unpatented, 160 acres, 10 miles from Willcox, have shafts of 76', 50' and 60', and crosscut tunnels of 75', 125', 100' and 17', showing silver-copper ore. The company writes that its land will be patented before serious mining work is undertaken.

SUNSET-NATIONAL MINING CO.

MONTANA

Mine near: Homestake, Jefferson Co., Mont. C. W. Foster, pres.; W. A. Beatty, sec.; R. L. Stevens, mgr., at last accounts. Capitalization \$500,000, shares \$1 par. Lands, 8 claims, 2 patented, 125 acres, in 2 groups, 1 ad-

joining the Lion Gulch mine, 4 miles north of Homestake and about 8 miles east of Butte. The claims show fissure veins in granite that carry small ore shoots with clay gouge. The veins vary from 3 to 10' in width, but the orebodies are small and not rich enough to cover development expenses. Development includes the National shaft of 120', the Sunset shaft of 165', and a 250' tunnel, the former said to show a vein of 3 to 14' width, carrying a paystreak of ore averaging 2.5 to 13% copper, up to 12 oz. silver and \$3.40 gold per ton. Idle.

SUPERIOR BONANZA MINING CO.

MEXICO

Incorporated under laws of Wyoming. Legal domicile, Cheyenne, Wyo. Head office, Cananea, Sonora, Mex. Controlled through stock ownership by Greene Cananea Copper Co. Authorized capital \$1,250,000; shares issued, 74,923. J. S. Douglas, pres.; John Cuddihy, vice-pres.; George Young, vice-pres. and sec.; J. V. Montague, treas. and asst. sec.; J. F. Carmichael, asst. treas.; preceding officers, A. E. Peterman, A. S. Cox, A. C. Cole and W. L. Thomas, directors. Owns the entire capital stock of Bonanza Mining Co., S. A.

SUPERIOR & BOSTON COPPER CO.

ARIZONA

Office: Houghton, Mich. Mine office: Globe, Gila Co., Ariz. Wm G. Rice, pres.; John H. Rice, vice-pres.; John R. Pimlott, sec.-treas.; preceding officers, Hon. Norman W. Haire and Jas. W. Harrington directors.; E. B. Tinker, supt.

Organized Nov. 23, 1906, under laws of Arizona, capitalization \$6,500,000; was originally \$1,500,000, increased Sept. 5, 1908 to \$2,000,000, April 22, 1909, to \$2,500,000, July 25, 1911, to \$3,000,000, and again increased Sept. 30, 1911, to present amount; shares \$10 par, \$6 paid in; issued, 283,827. Company has levied 6 assessments, last one of \$1, Jan. 4, 1913. Balance sheet of fiscal year ending Sept. 30, 1913, showed an income of \$421,939, of which \$153,436 was from ore sales, \$265,211 from calls and \$3,291 from interest. Expenditures were \$428,052, including \$319,093 for development and office expenses, \$8,959 for construction and mine equipment and \$100,000 in loans repaid. Balance of assets Oct. 1, 1913, was \$75,268 compared with \$81,381 in 1912. Shares are listed on the Boston Stock Exchange. State Street Trust Co., Boston, registrar; Boston Safe Deposit & Trust Co., transfer agent. Annual meeting, first Monday in December.

Lands, 51 claims, 785 acres, of which 28 claims, 388 acres, are patented. The Globe & Arizona tract of 22 claims was bought for \$320,000, an adjoining group of 21 claims was bought for \$46,000, and the Collins-Doyle group of 5 claims was bought for \$150,416.35, giving a total cost of \$516,416.35 for lands. The Collins-Doyle group, added 1909, adjoins the former holdings on the north, carrying the extension of the Old Dominion fault, and being well located with respect to the Great Eastern vein. The property, as now constituted, is a compact tract next east of the Arizona Commercial, and east of the Old Dominion. Lands are about 4,200' above sea level, and about 800' above Pinal creek, at Globe. The property carries both limestone and iron ore for fluxes. It is reached by the Arizona Commercial and Arizona Eastern railways, both connecting with the main line at Globe.

The property shows diabase cutting through about 600' of quartzite with interbedded shale and Globe limestone. The copper ore occurs in veins filling fault fissures. There are 2 dominant fault-belts, one series including from north to south, the Old Dominion, Great Eastern or Black Hawk, Limestone, Quo Vadis, Black Oxide and Iron King fault veins, intersected at nearly right angles, by other faults of later age, apparently but slightly mineralized. Three of the veins named show ore in commercial quantities. The average strike of the faults is N. 70° E., with average dip of 60° N. The

oxidized zone is deep, ore opened on the 8th level including cuprite, native copper, as well as chalcocite. Malachite is found in the workings above.

Development is by 4 shafts, known as the McGaw, Great Eastern, Limestone and Gardner, aggregating 2,477', and 1 tunnel. The Great Eastern shaft, sunk vertically to 444' depth being poorly located, has been replaced by the McGaw shaft, to the north.

The McGaw shaft is 1,185' deep, with 3 compartments, one of 5x7' and 2 of 5x4' 6" each. The 10th level opened at 970' corresponds with the 10th level of the Arizona Commercial mine, next west. This shaft lies 900' north of the old shaft and is sunk between the Old Dominion fault on the north and the Great Eastern vein on the south and is planned to intersect the great Eastern vein at depth. This is the main working shaft of the mine and does the ore hoisting for the entire property.

In the early development of the mine, ore was found on the 100', 300' and 400' levels of the Great Eastern shaft, the upper levels showing leached ore, but the 400' level having a shoot of commercial ore extending 230' from the eastern boundary of the Arizona Commercial, while on the sub-level 56' deeper, the ore shoot was 320' long, proving that it raked eastward. At 456' considerable chalcocite was found increasing with depth. The average width of the Great Eastern orebody on the 400' level and 456' sub-level was 20', all shipping ore averaging 7 to 10% copper and yielding several million pounds copper.

The Great Eastern vein on the 6th level in the McGaw shaft, shows an ore shoot 10 to 30' wide, proven for a distance of about 800'. The 8th level has exposed this vein for about 400' and also shows the zone of oxidation to continue to this depth. The 10th level discloses the first sulphide ore encountered in the McGaw workings of the mine, but the 12th level shows little or no copper in this vein, as far as developed. The vein matter is heavily stained with iron, highly silicious and, when commercial, carries about 7% copper.

The Old Dominion vein is tapped by crosscuts from the McGaw shaft, on the 4th, 6th and 10th levels, where it shows only oxidized material, quite thoroughly leached, carrying slight silver values, but with promise of copper ore at greater depth.

The Limestone shaft is 318' deep, with levels at 100', 200' and 300', the latter showing a 4' footwall paystreak of commercial ore, with improvement, on the successive levels, in both width and grade of ore, giving promise of good orebodies at greater depth.

The Gardner vertical shaft, started April 4, 1908, at the southern end of the property, on the Black Oxide vein, has 3 compartments, one of 5x7' and 2 of 5x4' 6" each, framed with 10x10" timber, and is 435' deep, no sinking having been done since 1908. The Black Oxide vein apparently is a continuation of the Buckeye fault, on which the Old Dominion has opened mines on the Buckeye, Carrie and True Blue claims.

The 1,054' Black Oxide tunnel has its portal about 1,000' S. W. of the Limestone shaft, and cuts the Black Oxide vein at 670', giving a 400' back, drifts on this level showing a vein carrying micaceous hematite, with small quantities of copper, and a little shoot of smelting ore, from which lessees extracted a small amount of 7% copper ore in 1910. Indications are favorable to the existence of good bodies of high-grade sulphide ore at greater depth. The Black Oxide is 280' east of the True Blue mine of the Old Dominion, from which lessees have shipped small quantities of high-grade ore for several years past.

The Iron King vein, parallel with the other 4 faults of the property,

shows a good gossan, and has an old 70' shaft, in leached vein material similar to that in the other faults, at similar depth.

The mine as a whole has about 27,000' of workings. The development for the year ending Sept. 30, 1913, comprised 5,842', mostly drifts and crosscuts.

Equipment includes hoists at each shaft, aggregating 1,260 h. p. The main plant, at the McGaw shaft, has four 250-h. p. Stirling water-tube boilers, a 5-ton 14x14x28" hoist good for depth of 1,600', and a 1,200-cu. ft. Nordberg cross-compound air compressor; there is also an auxiliary compressor at another shaft. The mine has two 1,000-gal. Prescott pumps.

The company owns 38 buildings, including a 40x40' machine shop, 32x40' smithy, 40x60' carpenter shop, 40x60' office and warehouse, and other mine structures, with a considerable number of dwellings for employees. The shops are well equipped and the smithy has a Word drill sharpener. The changing house at the McGaw shaft has steam-heated lockers, showers baths and drying racks. Buildings are lighted by electricity. Fuel is mainly petroleum, with 5,000-gal. and 12,000-gal. storage tanks.

Production was begun Feb., 1908, and to end of 1910 amounted to 27,126 tons ore, yielding 3,846,402 lbs. copper and 94,698 oz. silver, all from the Great Eastern vein above the 6th level with the exception of about 681 tons extracted by leasers from the Black Oxide workings. Ore reserves having been exhausted, production was suspended Aug., 1910, to March, 1913, when ore shipments were again resumed and gradually increased to about 150 tons daily, Nov., 1913. Production for fiscal year ended Sept. 30, 1913, was 15,458 tons ore averaging 5.56% copper and 1.91 oz. silver per ton, yielding 1,747,433 lbs. copper and 29,567 oz. silver. Property considered good and management competent and energetic.

SUPERIOR & BOSTON COPPER MINING CO.

WISCONSIN

Office: care Ernest A. Arnold, Superior, Wis. Organized under laws of South Dakota, capitalization \$1,500,000, shares \$1 par.

Property, the old Fond du Lac mine, in Douglas county, opened by 2 shafts of 60' and 75', sunk on a 52' amygdaloidal lode in No. 1 shaft and a 16' lode in the No. 2 shaft. Idle since 1902.

SUPERIOR COPPER CO.

MICHIGAN

Office: 12 Ashburton Place, Boston, Mass. Operating office: Calumet, Mich. Mine address: Houghton, Mich. Quincy A. Shaw, pres.; Rodolphe L. Agassiz, vice-pres.; Geo. A. Flagg, sec.-treas.; Jas. MacNaughton, gen. mgr., and Francis L. Higginson, directors.; Ocha Potter, supt.

Organized July 23, 1904, under laws of Michigan, capitalization \$2,500,000, shares \$25 par; fully issued, and \$1 paid. Is controlled, through ownership of 50,100 shares, bought, 1906, by the Calumet & Hecla Mining Co.. Financial report for 1910, showed a balance of liabilities of \$8,572.77 which increased, 1911, to \$73,089.06. The report for 1912 showed a net profit of \$172,873.14, and balance of assets of \$99,784.08. Shares are listed on the Boston Stock Exchange. Old Colony Trust Co., Boston, registrar; American Trust Co., Boston, transfer agent. Annual meeting, second Tuesday in June.

The property, comprising 400 acres, carries about 6,000' of the strike of the Baltic amygdaloidal bed, between the Isle Royale and Atlantic mines. It embraces Sec. 15, of T. 54 N., and R. 34 W. The tract has room for 3 or 4 shafts, and has a light overburden, the bed being proven by trenches at intervals of 1,000', these showing an amygdaloid of 35 to 40' average width, having extensive carbonate stains, due to weathering, with a little fine copper near surface. The property has been trenched to the eastern sandstone.

The mine has 2 workable copper lodes, the Baltic, locally known as

the Superior, and the West lode, discovered in 1911, a formation independent of the Superior, 14 to 30' thick which, however, cannot be stoped until the Superior lode is mined.

The mine has 2 shafts, both sunk in the footwall of the lode, insuring solid ground, but necessitating crosscuts at each level. Owing to the great width of the copper-bearing stratum, it is necessary to crosscut along the bed at 100' intervals. The drifts are driven along the center of the bed to obtain a fair average of its values. The Superior mine is opened on the northern extension of the Baltic amygdaloidal bed, though some men call this the Superior lode, not being satisfied that this correlation is correct. The Baltic bed, in the Superior mine, carries copper impregnations in the footwall, always an evidence of strong mineralization, and there is a conglomerate bed under the foot that carries a small amount of copper. The stamp rock is remarkably deceptive in appearance, as the copper oxidizes readily, and when it has been broken a few weeks, appears lean, unless a fresh fracture shows its true nature. As a triangular tract of land intervening between shafts No. 1 and 2 is owned by others, they cannot be connected above the 12th level. The mine had about 7 miles of workings at the end of 1912.

No. 1 shaft, located about 1,200' south of the northern boundary of the property, was 2,014' deep at end of 1913. This shaft develops the Superior and the West lodes, the first opened on all levels, and the second lode from the 12th to 20th inclusive. Both lodes carry copper in exceptional quantity.

Improved values have been encountered with depth, and the workings of No. 1 shaft give a good showing, with the exception of several drifts that ran into a series of faults north of the shaft, some of which have since passed through one of the faults, and are again in good ground. The ground in this shaft, especially in the upper levels, is very treacherous, and requires careful attention and close timbering.

No. 1 shaft has a frame shaft rock house, of the Calumet & Hecla type, equipment including a Westinghouse engine and two 23x36' crushers. The hoist is good for a depth of 4,000'.

No. 2 shaft, 2,540' S. W. of No. 1, and 2,400' from the southern boundary, sunk 40' in the footwall, at an angle of 53°, was about 1,700' deep, Dec., 1913. This shaft has but a limited amount of drifting, the bed being reached by crosscuts. Equipment at No. 2 includes a steam hoist, formerly used at No. 1, and a shaft rock house having two 17x24" crushers and a Westinghouse engine, with rated capacity of 1,000 tons daily.

The equipment at No. 1 shaft includes a combination boiler and engine house, with 90" Belpaire boilers, a hoist, and 10-drill and 18-drill air compressors. No. 1 shaft is connected with the main line of the Atlantic railway by a 7,000' spur, and also with the Isle Royale railway.

Buildings include an office, warehouse, smithy, change house, and a number of dwellings for employes at a small town site lying between the shafts.

Production was begun Jan., 1909, and was at the rate of 600 tons of rock daily, in 1912. Returns from rock stamped were 21.82 lbs. fine copper in 1909, 22.64 lbs. in 1910, 19.90 lbs. in 1911, 22.76 lbs. in 1912, an excellent return, and materially above the average secured from the good amygdaloidal mines of the Lake Superior district. Production has been as follows: 1909, 1,789,315 lbs. copper; 1910, 3,181,041 lbs.; 1911, 3,236,233 lbs.; 1912, 3,921,974 lbs.; 1913 (6 mos.), 1,705,000 lbs.

The cost of production is high, having been 14.29 cts. per lb. fine copper in 1910, 15.31 cts. in 1911, 12.75 cts. in 1912 and 13.55 cts. in the first 6 months of 1913. The average cost of mining and milling per ton is between

\$2.25 and \$2.50, an unusually high figure among Lake Superior amygdaloid mines, largely accounted for by the comparative newness of the mine. The Superior is one of the very richest mines opened in this district, and has an excellent management.

SUPERIOR COPPER CO., LTD.

ONTARIO

Office: Sault Ste Marie, Ont. Mine office: Superior Mine, via Algoma Central Railway, Algoma, Ont. G. R. Nicholson, pres.; C. H. L. Jones, vice-pres.; Emory W. Clark, sec. and treas.; preceding officers, E. L. Fisher, Capt. John Mitchell, Geo. T. Arnold, J. W. Staley, Geo. Kemp and Capt. Benj. Boutell, directors.

Organized Sept. 13, 1901, under laws of Ontario, capitalization \$1,500,000, increased 1903, to \$2,000,000, and again increased July 29, 1907, to \$3,000,000, shares \$10 par; issued, \$2,402,160. The company was organized with nonassessable stock, but a special act of the provincial parliament of Ontario rendered the stock assessable. Total assessments to Dec. 31, 1910, were \$132,080.52. Security Trust Co., Detroit, registrar and transfer agent. Annual meeting, second Thursday in June.

Property, 11 claims, crown granted, 800 acres, in an unorganized mining district of Algoma, shows granite and chloritic schist carrying fissure veins of 10' and 70' estimated average widths, traceable 7,000'. The quartz veins carry chalcopryite with a little chalcocite, estimated by the management to average 4% copper, 1 oz. silver and 40 cts. gold per ton. Development, amounting to 1,233' includes a 400' shaft and a 949' tunnel with other shafts of 90', 114', 154', 50' and 90', besides a 189' tunnel and many surface cuts.

Mine is reported to show 4,000 tons of ore on the dump, with 140,000 blocked out, apparently a serious over-estimate.

Equipment includes a 150-h. p. steam plant, 12-drill compressor engine house, changing house, boarding house, machine shop, smithy, office, store and dwellings, and a 50-ton concentrator.

The property is connected with the Algoma Central railway. The mine has been idle since Dec., 1908. Property considered promising.

SUPERIOR COPPER MINING CO.

WASHINGTON

Mine office: Chewelah, Stevens Co., Wash. Organized 1907, under laws of Washington, capitalization \$1,500,000, by Carl Montgomery, P. M. Poole and John C. Witherspoon. Lands carry 3 veins, of which 1, of 14' claimed average width, is opened by a 600' crosscut tunnel, showing auriferous and argentiferous copper ore and galena. The mine was leased, 1912, for 3 years, to J. B. Sullivan, W. L. Marsh, C. Gleiforst and W. L. Smith, of Chewelah.

SUPERIOR & GLOBE COPPER CO.

ARIZONA

Office: 3 Calumet State Bank, Calumet, Mich. John Daniell, pres.; Fred Smith, vice-pres.; Chas. Chynoweth, sec.; Joseph W. Selden, treas., and Hon. Norman W. Haire, directors. Organized Dec., 1908, under laws of Arizona, capitalization \$3,000,000, shares \$10 par; issued, \$2,450,000, in 15,000 shares of full paid stock and 230,000 shares of stock \$1 paid. Property is fully paid for, lands having been bought for \$75,000 cash and 15,000 shares of full paid stock, and company began business with about \$125,000 cash. Cash surplus was \$4,311.85, Nov. 1, 1911. The promoters took 30,000 shares of \$1 paid stock for their services. First National Bank, Calumet, registrar. Annual meeting, third Monday in November.

Lands, 13 claims, 250 acres, include the Magnet group of 12 claims, adjoining the Mineral Farm group of the Globe Mining Co., and 1 fractional claim, of several acres. The property, 2 miles N. E. of Globe, is in the eastern portion of the Globe district, lying north of the Arizona & Michigan and N. E. of and adjoining the Globe Mining Co. and the Yuma mine of the Old Dominion, latter carrying the Yuma-Big Johnnie-O'Dougherty

fault. The outcrop of the Yuma fault, on the Superior & Globe lands, shows an iron gossan carrying copper stains for about 3,000'.

There are several old shafts of 50 to 60' depth, said to have been sunk for gold ore. Present owner has sunk a 680' vertical shaft in the hanging of the Yuma fault, on Copper Trust No. 2 claim, about three-fourths mile from the Superior and Boston mine. The shaft cuts a 5' vein carrying iron with copper stains and has about 1,100' of workings on the 650' level, the north crosscut 522' long showing 2 veins. The Yuma vein, cut at 235' from the shaft, has 320' of drifting, with an 85' winze and a 17' crosscut to the vein from the bottom of the winze. The vein shows merely iron and manganese, with copper stains and small silver contents. In the north crosscut, 487' from the shaft, a second vein was cut showing a width of 20' and a 38' drift thereon showed material similar to that in the other vein, neither carrying commercial values. The south crosscut on the 650' level was driven 233' in hard diabase, developing nothing of value.

Underground work was discontinued and diamond drilling begun in June, 1910, a 350' horizontal and a 957' vertical hole being bored from the bottom of the shaft. This work was continued until early 1912, but developed nothing of importance.

Equipment includes a 100-h. p. gasoline plant having a 60-h. p. Fairbanks-Morse hoist good for 1,000' depth, and a 3-drill gasoline air compressor. There are 5 buildings, including a 14x22' carpenter shop, engine house, office and dwelling.

SUPERIOR MINING CO.

WASHINGTON

Office: 407 Truax Bldg., Superior, Wis. J. P. Simon, pres. and treas.; B. A. Baerlocher, sec. and supt., at last accounts. Organized 1902, under laws of Washington, capitalization \$2,000,000, shares \$1 par. Lands, 4 claims, 80 acres, and a mill site, 4 miles south of Berlin, in the Money or Miller Creek district, opened by a 140' tunnel, showing a 5 to 8' fissure vein in granite, carrying copper ores, mainly auriferous, argentiferous and cupriferous pyrite, and galena with talcose gangue, assaying about 6% copper, 7 oz. silver and \$1 to \$30 gold per ton. Idle some years, except for annual assessment work.

SUPERIOR & PITTSBURGH COPPER CO.

ARIZONA

Office: Calumet, Mich. Is a subsidiary of the Calumet & Arizona Mining Co. Mine office: Warren, Cochise Co., Ariz. Chas. Briggs, pres.; Capt. Jas. Hoatson, first vice-pres.; Capt. Thos. Hoatson, second vice-pres.; Gordon R. Campbell, sec.; Peter Ruppe, treas.; John C. Greenway, gen. mgr.; preceding officers, Thos. F. Cole, Geo. E. Tener, Chas. d'Autremont, Jr., Chester A. Congdon and Henry R. Rea, directors; Henry B. Paull, auditor.

Organized June 30, 1907, under laws of Minnesota, capitalization \$20,000,000, shares \$10 par; issued, \$14,997,920. The company was a merger of the Calumet & Pittsburgh Mining Co., Lake Superior & Pittsburgh Mining Co., Pittsburgh & Duluth Mining Co. and Junction Mining Co. The Calumet & Arizona Mining Co. owns 1,396,528 shares of this company's stock. The company ended 1910 with a balance of assets \$1,349,642 and Jan. 1, 1913, had a surplus of \$2,785,308. Net earnings in 1912 were \$3,393,618. Dividends aggregating \$1.16 were paid in 1911 and \$1.28 in 1912, since which time dividends of 38 cts. per share have been paid quarterly.

Lands, 100 claims, patented, 1,354 acres, in the heart of the Warren, or Bisbee district, Ariz. The holdings include 44 claims, 629 acres, formerly held by Lake Superior & Pittsburgh; 21 claims, 325 acres formerly held by Calumet & Pittsburgh; 17 claims, 215 acres, formerly held by Pittsburgh & Duluth, and 18 claims, 185 acres, formerly held by the Junction. The major portion of the Junction tract is covered by Bisbee conglomerate, flanked by

porphyry and limestone. The property contains large replacement deposits in limestone, often along porphyry contacts and connected with vein fissures. These deposits are similar in character and origin to those of the Copper Queen and of the Calumet & Arizona mines. The orebodies now mined consist of direct smelting pyritic ores and the largest deposits are found in the Junction mine. There are 5 working shafts, the Junction 1,837' deep, Hoatson 1,575', Cole 1,450', Briggs 1,530' and Congdon 1,267' deep. The mines are extensively developed, new openings having been 27,847' in 1910, 25,222' in 1911 and 29,547' in 1912, an average of about 5 miles new workings yearly.

The Cole shaft, formerly known as No. 2, and sunk nearly 1,000' by the former owners, was cut down to 3 compartment size, 8x24' in outside measurement and retimbered, work being done simultaneously on 10 levels, in record-breaking time. This shaft has been the principal outlet for ore from Pittsburgh & Duluth territory. The Cole shaft opens up large orebodies on the 900', 1,000' and 1,100' levels, ore improving with depth and a shoot of great size has been developed on the Granville claim, between the 800' and 1,000' levels. The Cole shaft has Prescott and Cameron station pumps, caring for a flow of 225 gals. of water per minute and was shut down Sept. 25, 1910, in the interests of economy.

The Briggs shaft, about 2,000' south of the Junction shaft, is 1,550' deep and 3,000' east of the Lowell shaft of the Copper Queen. The Briggs shaft shows enormous bodies of leached ore similar to that capping big commercial orebodies of adjoining mines. The first level at 910' shows 600' of good ore. Low-grade sulphide ore, averaging about 2% copper, was cut at 1,265', continuing to bottom of shaft. Two other bodies of low-grade sulphide ore, with about 7% copper, were developed on the 1,300' level for upwards of 500' without reaching the end. The Briggs shaft has an 8' airline and two 12" water columns, with 3 pumps, and raises about 400 tons of ore daily.

Equipment at the Briggs shaft includes a steel gallows frame. The power plant has 7 boilers, 5 of 250 h. p. each, burning crude petroleum, with a powerful hoist, and an 18-drill Sullivan straight-line air compressor.

The Hoatson shaft, on the Del Norte claim, 2,500' from the Briggs, with collar 150' higher than the Junction shaft, has 4 compartments, and is 1,530' deep. This shaft shows tremendous bodies of leached ore and a very large tonnage of low-grade sulphides is being developed at depth. The 12th level shows some oxidized ores, including cuprite, and the lower workings also carry high-grade oxides and sulphides, similar to those in the Lowell shaft of the Copper Queen. The big body of oxidized ore has been opened for a length of 700' and width of 100' on the 1,200' level, and is about 120x700' in size on the 1,300' level, and 90x175' on the 1,400' level, and extends almost to the 1,500' level. This shaft has a 1,000-gal. pump on the 1,300' level.

Equipment at the Hoatson shaft includes a steel headgear, and a double-drum hoist, good for 1,500' depth. The power plant has 6 boilers, and there is a framing mill, duplicating that at the Oliver shaft of the Calumet & Arizona.

The Congdon shaft, developing the Pittsburgh & Duluth tract, on the Black Bear claim, only 650' from the Calumet & Arizona mine, is 1,267' deep, but has been out of commission several years, as the territory can be worked to better advantage through the Cole shaft. The Congdon shaft has a 1,000-gal. pump on the 1,000' level. Surface equipment includes a 300-h. p. steam plant, with a 12x36" double-drum hoist and a 5-drill straight-line air compressor.

The Powell shaft is on the line of the Hope and Wagner claims of the Calumet & Arizona, on ground formerly owned by the Pittsburgh & Du-

luth. Equipment includes a Hendrie & Bolthoff double-drum hoist, a Sullivan air compressor and two 75-h. p. Atlas boilers.

The Junction shaft, sunk on the boundary line of the Calumet & Pittsburgh and Junction tracts, has 4 compartments, and was 1,837' deep at end of 1912, being the deepest, by nearly 200', of any shaft in the Bisbee district. The 1,300' level shows considerable leached ground and a small body of good sulphide ore, and the 1,400' level shows a big body of low-grade ore, with about 40' of high-grade ore on the Rathmoon claim. At depth of 1,750' the Junction shaft shows a small body of rich sulphides. The big developments of the Junction shaft are on the south drifts of the 1,300', 1,400' and 1,500' levels, where, on the Oregon claim, there has been developed what is perhaps the richest body of sulphide ore ever found in the Bisbee camp. It has been proven for an average of 20' width and length of 415' on the 1,300' level, with a width of 15 to 40' on the 1,400' level, and for width of 55 to 100' and length of 375' on the 1,500' level, this ore-body averaging about 10% copper, and forming in itself a very large and valuable mine. At 1,700' depth the Junction develops a shoot of sulphide ore of fair grade, which apparently extends down to the 1,800' level.

The Junction shaft drains the entire mine, and also, owing to its location and depth, drains both the Calumet & Arizona and Copper Queen workings, raising upwards of 1,500,000,000 gals. per annum. A station on the 1,200' level has a pump of 2,000 gals. capacity per minute, and the station on the 1,500' level has a 2,500-gal. Prescott pump. The tremendous flow of water from the Superior & Pittsburgh is not entirely wasted, as this flow, averaging 4,000,000 gals. daily, for every day of the year, is utilized largely in the irrigation of formerly desert lands on the flat toward Naco, south of the mine.

Equipment of the Junction shaft includes a 75' steel headgear, planned for 5 compartments. The power plant has a 16x42" Nordberg 4-cylinder incline double-frame hoist, good for 1,500' depth, which is a duplicate of that at the Cole shaft, and there are 12x14" and 12x15" auxiliary hoists. There are 2 cross-compound air compressors, of 12 drills aggregate capacity, and a Nordberg 4-cylinder triple-expansion air compressor, having capacity to compress 5,975 cu. ft. of free air per minute to a pressure of 70 lbs. per sq. inch. The boiler plant includes ten 250-h. p. marine boilers, and there are three 5,000-gal. oil tanks for the storage of petroleum. There also is a large machine shop at this shaft.

The property is served by the El Paso & Southwestern railway, reaching all the principal shafts and shops.

The ore of the Superior & Pittsburgh is smelted by the Calumet & Arizona Mining Co. The value of precious metals recovered was equal to \$21.20 per ton of finished copper in 1911, and \$27.10 per ton of finished copper in 1912. The net cost of refined copper produced, after deducting values of precious metals, was 6.6 cts. per lb. in 1911, and 6.33 cts. in 1912.

Production has been as follows:

Year.	Copper, oz.	Silver, oz.	Gold, oz.
1906.....	9,084,875	32,564	143
1907.....	9,691,405	55,464	.....
1908.....	21,924,359	182,773	1,267
1909.....	24,325,667	169,177	3,856
1910.....	26,183,146	(not reported)	.....
1911.....	28,469,166	236,960	8,785
1912.....	36,618,399	361,227	13,815

The relations of the Superior & Pittsburgh with the Calumet & Arizona have been extremely close from the inception of the enterprise, both com-

panies having practically the same directorate. But for the help of the Calumet & Arizona, the Superior & Pittsburgh scarcely could have been made a success. Plans for merging these companies were given very careful thought and the physical valuation was made by Mr. Walter Douglas and Dr. L. D. Ricketts, both thoroughly acquainted with the Bisbee camp, but personally disinterested. The plan of consolidation called for the giving of $3\frac{1}{2}$ shares of Superior & Pittsburgh for 1 share of the new consolidated Calumet & Arizona stock, after the previous payment, by the Superior & Pittsburgh, of a dividend equal to $2\frac{1}{7}$ times the amount of all dividends paid by the Calumet & Arizona between Aug. 1, 1910, and April 1, 1911, in the consummation of which plan a dividend of 86 cts. per share was paid by the Superior & Pittsburgh. All but about 100,000 shares of the Superior & Pittsburgh stock had been deposited Jan., 1913, for conversion into the stock of the Calumet & Arizona, at the ratio of $3\frac{1}{2}$ to 1, and the Superior & Pittsburgh Copper Co. will in time be fully merged in the Calumet & Arizona Mining Co., and the company wound up.

SUPERSTITION MOUNTAIN MINING CO.

ARIZONA

Mine office: Florence, Pinal Co., Ariz. F. S. Hoyt, superintendent, at last accounts. Property, 30 claims, about 30 miles north of Florence, in the Superstition mountains, show promising copper outcrops developed by shaft. Equipment includes a small mill, including a Huntington mill. It was started in 1910 and the first test shipments of concentrates assayed 26% copper, 39.6% lead, 502 oz. silver and \$6 gold per ton. Presumably idle.

SUTTON CONSOLIDATED MINING CO.

NEW MEXICO.

Office: Elgin, Ill. Mine office: Lordsburg, Grant Co., N. M. Robt. F. Fitz, general manager, at last accounts. Lands include the Last Chance, Clara Sutton, James Thomas and Olivia properties, in the Pyramid district, 8 miles south of Lordsburg, showing veins in igneous rocks, diorite and andesite, the principal vein of 7' width carrying gray copper ore with good silver values in the upper workings, and copper increasing at depth. Development is by the 275' Last Chance shaft. Equipment includes steam power. Presumably idle.

SWANSEA CONS. GOLD & COPPER MINING CO.

ARIZONA

Office and works: Swansea, Yuma Co., Ariz. Camille Clerc, gen. mgr.; W. H. Seamon, smelter supt. Organized 1912, as the successor of the Clara Consolidated Gold & Copper Mining Co., which was declared bankrupt Jan. 27, 1912. Capitalization \$4,000,000, shares \$1 par.

Lands are reported as 132 claims, 3,300 acres, about 10 miles from Planet. Property consists of the Signal mine, erroneously called the Clara, and the Moro and Clara groups.

The Signal orebody is a replacement deposit formed in a limestone bed 15 to 100' thick, associated with overlying shales and amphibolitic schist and resting on granite gneiss, all of pre-Cambrian age. The outcrop is an irregular replacement, 30' wide, of copper-stained hematite, dipping at 52° N. This orebody extends 150' downward in the mine, is 20 to 30' wide, 90' long and contains boulders of unreplaced limestone. The orebody is encased in soft chloritic schist derived from amphibolite and appears to rest on a strong fault plane that separates the granitic gneiss from the sedimentary series. Two parallel, smaller, but similar orebodies occur in the hanging wall of the deposit. The ore consists of soft, red hematite with manganese-oxide and chlorite, holding grains and nodules of chalcopryrite and pyrite. The ore as a whole averages perhaps 2.5% copper, though 4% ore is obtained for smelting by rough sorting.

Development is by 2 main shafts with extensive underground workings along the main fault or lode, and by stopes on 3 orebodies. The mine has

4 vertical and 2 inclined shafts. No. 1 shaft, 400' deep, vertical, has a 15-h. p. Fairbanks & Morse gasoline hoist, raising ore with a bucket. No. 2 shaft, 325' deep, is an incline, and has a 50-h. p. Western gasoline hoist, operating a 2-ton skip. No. 3 shaft, also inclined, is 200' deep. No. 4 shaft, the largest and deepest, having 3 compartments, is 500' deep, with a hoist. No. 5 shaft, 373' deep, has a 75-h. p. steam hoist, and No. 6 shaft, 250' deep, has a 25-h. p. steam hoist. Some drilling done 1908, with a Key-stone churn drill, showed another orebody.

The power plant has two 250-h. p. boilers, a 300-kw. d. c. Westinghouse motor, and a 150-kw. belt-driven Ideal motor, latter operating pumps at the Bill Williams Fork river, supplying water to the mine and works through 3" and 6" pipe lines. Buildings include a machine shop, sawmill and other structures.

The smelter has a 44x292" Mitchell water-jacket blast furnace of 750 tons rated daily capacity, with a 125' stack, 7' in diam. A reverberatory furnace was being installed, April, 1913. The power house has a 15,000 cu. ft. Nordberg air compressor, and a Connersville blower direct-connected to a Hamilton Corliss compound engine. Slags are handled by a Jeffrey electric locomotive. The smelter building is of structural steel. The converter department has 2 stands and 9 shells, rotated electrically, with a 40-ton electric crane, having 2 auxiliary hoists, and a silica mill, with electric motor, for linings. The smelter was running on custom ore early 1913.

The mines and works are connected with the Santa Fé, Prescott & Phoenix railway by a 21-mile line, known as the Arizona & Swansea railroad, operated, but not owned by the company. The property is an example of enthusiasm run wild, coupled with reckless stock selling and the foolish construction of surface works before the development of enough ore to keep them busy.

SWANSEA SMELTER.

ARIZONA

See Swansea Consolidated Gold & Copper Mining Co.

SWARTHMORE CONSOLIDATED MINING CO.

COLORADO

Mine near Cardinal, Boulder Co., Colo. Chas. B. Galbreath, pres.; Harvey Hanes, vice-pres.; J. E. Carpenter, sec.; Paul Barriclow, treas.; H. H. Carpenter, gen. mgr., at last accounts. Organized July, 1907, under laws of Colorado, as a merger of the Swarthmore Copper Co. and Enterprise Mining Co., capitalization \$3,500,000, shares \$1 par.

Lands, 17 claims, 11 patented, 60 acres, are about 2 miles west of Cardinal and the D. B. & W. R. R. and in the Grand Island mining district of Boulder county. Property includes the Golden Fleece mine, having fissure veins in pre-Cambrian gneiss cut by dikes. The vein thus far developed averages 8' wide and carries a paystreak of 3 to 5% copper ore with occasional telluride of gold. Milling ore is estimated to carry \$10.84 and smelting ore \$24 per ton, in average metallic values. Development is by 5 shafts, deepest 403', and by tunnels of 800', 1,000' and 2,000'.

Equipment includes 2 small steam plants, one having a 60-h. p. hoist and a 12-drill air compressor. There is a small concentrator with a 50-ton chlorination plant, and 4 new mine buildings. Idle.

SWASTIKA COPPER MINING CO., LTD.

MONTANA

Mine near Carter, Missoula Co., Mont. J. B. Purcell, pres. and mgr.; J. W. McDonald, vice-pres.; Geo. E. Marlowe, sec.; Thos. N. Marlowe, treas. Organized July, 1907, in Montana, capitalization \$150,000, shares 10 cts. par, fully issued.

Lands, 4 claims, 80 acres, and a 5-acre mill site. The property, well timbered, near the King and Queen mine, and about 2 miles W. of Carter, shows 2 parallel veins of 6 to 8" width, said to be traceable one-half mile,

having 2 to 4" paystreaks carrying malachite, bornite and chalcopryrite ores, said to give assays of 17 to 32.5% copper, 1 to 2 oz. silver, and from a trace to \$6.40 gold per ton. Test smelter shipments are said to have returned about 25% copper, with fair gold and silver values. Development is by 12 trenches, and tunnels of 60', 200' and 270'.

Equipment includes necessary mine buildings. Was developing and preparing for production, at last accounts.

SWASTIKA COPPER & SILVER MINING CO.

ARIZONA

Office: Tucson, Pima Co., Ariz. Mine address: Twin Buttes, Pima Co., Ariz. W. K. Royce, pres. and gen. mgr. D. H. Cochran, vice-pres.; J. S. Hopley, sec.; J. M. Ormsby, treas. Capitalization \$1,500,000, shares \$1 par. Lands, unpatented, include the Swastika group of 14 claims and the Calendar group of 10 claims, about 3 miles S. of Olive, or Twin Buttes camp. The Swastika group carries silver-lead ores, and the Calendar group has silver-copper ores in contact metamorphic deposits between limestone and granite. The property also includes the Pioneer and Alice mines. The property has 360' of workings, and was said, Jan., 1911, to have made a good strike of copper ore. Equipment includes a small steam plant. Presumably idle.

SWASTIKA MINE.

MONTANA

Mine office: Phillipsburg, Granite Co., Mont. Mr. Williams, mgr.; C. E. Hansen, sec.

Property, known as the old Basin mine, shows a 10' vein of argentiferous copper ore, oxidized to carbonates near the surface, where it is exposed by trenching. Development consists of a 125' shaft, said to show ore averaging \$25 to \$35 per ton in silver, with additional values up to 10% in copper, which is important if true.

Equipment includes an electric hoist good for 500', an air compressor, and a No. 7 Knowles sinking pump.

Was planning to make a regular production, Nov., 1913.

SWISSHELM MOUNTAIN MINING CO.

ARIZONA

Office: Warren, Ariz. Mine address: McNeal, Cochise Co., Ariz. M. S. Peysert, pres.; S. H. Tallman, sec.-treas.; W. R. Shanafelt, supt., at last accounts. Organized 1911, under laws of Arizona, as the successor of the Swisshelm Development Co., capitalization \$2,000,000, shares \$1 par.

Lands, 16 claims, about 10 miles from McNeal, in the N. E. end of the Swisshelm mountains, several miles from a railroad. Property shows limestone and granite. Development is by a 275' tunnel driven along an ore zone of 40' width, said to carry cupriferous ores, but with values mainly in lead and silver. The mine has no power equipment.

SWITCHBACK CLAIM.

MONTANA

Mine address: Saltse, Missoula Co., Mont. Wm. Burke, superintendent. Property, 2 miles S. W. of Saltse, near the Monitor mine, is developed by 2 tunnels, longest 150', showing a very narrow vein of siderite and chalcopryrite ores, reported to carry more than \$2 per ton. Country rock is a green shale of the lower Newland formation.

SYCAMORE MINING, SMELTING & DEV. CO.

ARIZONA

Idle. Letters unclaimed at former office, Fort Worth, Tex., and Jerome, Yavapai Co., Ariz. C. G. Stover, pres. and gen. mgr.; H. Martin, vice-pres. and supt.; C. H. Plumb, sec.-treas., at last accounts. Organized under laws of Arizona, capitalization \$1,000,000, shares \$1 par.

Lands, on the Verde river, 4 miles from Jerome, but 13 miles by wagon road. The mine has a 325' two-compartment shaft, bottomed in low-grade chalcopryrite ore, assaying 1 to 3% copper. Equipment includes necessary mine buildings and a good steam plant.

SYNCLINE GOLD-SILVER-COPPER MINING CO.**NEVADA**

Office and mine address: Lida, Esmeralda Co., Nev. C. H. Beesley, pres.; H. Engel, vice-pres.; L. E. Campbell, sec.-treas. and gen. mgr.; preceding officers, F. A. Campbell and B. A. Howes, directors. Organized June 4, 1910, under laws of Nevada, as successor of Washington-Nevada Mining & Milling Co., capitalization \$1,000,000, shares \$1 par, nonassessable; issued \$799,700. Annual meeting, first Monday in January.

Lands, 22 claims, unpatented, 400 acres, with 120 acres in mill and smelter sites, 30 miles S. W. of Goldfield and 10 miles from a railway, in the Lida district. District shows Cambrian limestone and shale, cut by quartz monzonite, capped by volcanic rocks. The ores occur as impregnations and veins. The claims are reported by the management to carry 12 deposits, 4 under development of 4 to 20' average width, traceable 5,000', carrying a sulphide ore, said by company to give assays of 8.7% copper, 17 to 19% lead, 12% zinc, 4 oz. silver and \$1.90 gold per ton. Development is by 9 shafts, of 31 to 120' depth, and by 6 tunnels, of 12 to 140' length. Owing to lack of rail transportation, the complex nature of the ore, and the low price of copper, the company is devoting attention mainly to the development of lead carbonate ores.

Equipment includes a 15-h. p. gasoline hoist, and there are 5 mine buildings. The management plans deepening the main shaft to 200'.

TABATACACHI MINING CO.**MEXICO**

Mine near Nacozari, Sonora, Mex. J. L. Fife, pres.; A. M. Doheny, sec.; L. B. Vickerv, treas.; R. O. Fife, supt., at last accounts. Lands, 3 hectares, having about 1,500' of workings, developing silver-copper and lead ores. Equipment includes a 25-h. p. gasoline engine. Idle.

TABLE MOUNTAIN COPPER CO.**ARIZONA**

At Kelvin, Pinal Co., Ariz. Is controlled by Arimex Consolidated Copper Co.

TABOR y ANEXAS; COMPANIA MINERA EL.**MEXICO**

Mine office: Asientos, Aguascalientes, Mex. Antonio Morfin, pres.; Bruno Newman, mgr., at last accounts. Property shows ore giving assays up to 43% copper, with good gold and silver values. Idle, owing to Mexican revolution.

TACOMA SMELTING CO.**WASHINGTON**

Office: 165 Broadway, New York. Works office: Tacoma, Pierce Co., Wash. W. R. Rust, pres. and gen. mgr.; Edw. Brush, vice-pres.; F. W. Clark, treas.; L. D. Craig, sec.; L. C. Beyer and H. Y. Walker, directors. R. F. McElvenny, supt.; T. R. Wilkinson, refinery supt.; Roger Taylor, asst. supt. Organized under laws of Nevada, capitalization \$500,000, shares \$1 par. Is a subsidiary of the American Smelters Securities Co.

Property, a smelting plant with a 52-acre site, 6 miles from Tacoma, located on Puget sound, whose tidal flats are being reclaimed by filling in with slag. The property is well located for receipt and dispatch of materials, and has extensive wharves, with ore bunkers and automatic devices for unloading cargoes, the wharves being connected with all departments of the works by an electric tram line.

The smelter, originally of 300 tons capacity, built for lead ores only, has been increased to 1,200 tons daily capacity, and now treats lead matte, copper, lead, silver and gold ores and concentrates, from the entire western coast of North America, and a considerable tonnage of South American ores.

The smelter has three 60-ton mechanical roasters and two 10-ton hand-roasters. There are 6 blast furnaces, including four 100-ton stacks for lead ores, and a 400-ton water-jacket blast furnace for copper, 42x160" at the tuyeres, with forehearth 14' in diameter and 4' high, holding 60 tons of

molten matte. A 36" cupola resmelting furnace, with outside settler, can treat 75 tons of 50% matte daily. There is a circular slag-casting machine, having 144 tilting molds. The reverberatory furnaces are of 350 tons daily capacity. The 1,000' dust flues of the blast and reverberatory furnaces lead to a 306' stack of reinforced concrete.

The converter department, equipped with a 30-ton electric traveling crane, has 2 stands and six 72x100"-shells, of barrel type.

The electrolytic plant, increased from 35 to 50 tons daily capacity, has a 20-ton electric traveling crane for handling anodes and cathodes.

Electric power is received at 40,000 volts and stepped down to 100 volts for use, the works requiring about 2,000 h. p. There are 3 Connorsville blowers, driven by a 200-h. p. Westinghouse induction motor, furnishing blast for the lead furnaces. Fuel is petroleum, brought in tank steamers from the oil fields of southern California.

The Tacoma smelter is one of the most important custom plants on the Pacific coast, the management is progressive, and the metallurgical practice excellent.

TACOMA STEEL CO. BRITISH COLUMBIA & WASHINGTON

Office: Provident Bldg., Tacoma, Wash. Mine offices: Van Anda island, B. C., and Darrington, Snohomish Co., Wash. Joshua Pierce, pres.; E. M. Shelton, vice-pres.; A. Y. Eastman, sec.-treas. and gen. mgr.; Alex Grant, supt. Organized with capitalization \$5,000,000, reduced later to \$3,000,000. Paid a \$35,000 dividend April 2, 1907.

Lands include a property at Darrington carrying gold-copper ore, idle for some years, 4,000 acres of lands carrying coke and coal in Washington, 208 acres of iron ore lands on Redonda island, B. C., and the Marble Bay mine, 640 acres, crown-granted, near Marble Bay harbor, at the northern end of Texada island.

The Marble Bay mine, about one-fourth mile from the Cornell and Copper Queen mines, has ore of similar nature occurring as lenticular shoots of ore carrying argentiferous chalcopyrite, with bornite, in a garnetiferous marble near a contact between diorite and limestone. The mine is developed by a 1,350' three-compartment shaft, showing, on the lower levels, a vein of 18' width, with the copper values unchanged and gold values gaining with depth. Ore is reported by the British Columbian government to average 4.3% copper, 23 oz. silver and \$14 gold per ton.

Equipment includes steam and electric power, with 5 Lidgerwood hoists, 5-drill Ingersoll-Rand, small Canadian-Rand and 10-drill Allis-Chalmers-Bullock air compressors. Buildings include a power house, machine shop and there is a wharf, on Marble bay, having large ore bunkers, connected with the mine by a ground tram. In connection with the mine there is a limestone quarry and 4 kilns, with daily capacity of 300 bbls. of lime.

Production, shipped mainly to the Tacoma smelter, was 6,237 tons of ore, yielding 293,269 lbs. fine copper in 1907; 11,438 tons of ore, estimated to have yielded 1,250,000 lbs. fine copper, in 1909, 22,500 tons averaging 5% copper in 1911 and 17,870 tons in 1912. Mine considered valuable and management good.

TAFT & DUNLAP MINE.

NEVADA

Geo. Compton, owner. Mine at Mina, Mineral Co., Nev., is under option to a London syndicate for \$150,000. Property comprises several claims in the limestone hills, W. of Mina, from which shipments were made, 1913. Examined Aug., 1913, by R. W. Hadden, 1807 Harvard Blvd., Los Angeles, Cal.

TAFT MINE.

MONTANA

Mine address: Taft, Missoula Co., Mont. Is a prospect on the south

bank of the St. Regis river, W. of Taft. Development is principally by tunnel, showing a little siderite vein rock, but no sulphides. Country rock is a greenish shale. Ores are said to carry copper and gold in small quantities.

TAHOE COPPER MINE.

CALIFORNIA

Office: P. O. Box, 296, Placerville, Cal. Mine office: Greenwood Creek, El Dorado Co., Cal. L. H. Wilkins, manager. Property, 24 claims, about 420 acres, in Sec. 26, T. 12 N., R. 9 E. This tract is reported to carry an extensive gossan underlain by copper ores. The development work on the Lipton claim amounts to about 500' and 220 samples taken by the manager are said to average 5% copper. See Sacramento Valley Copper Co.

TAKILMA SMELTING CO.

OREGON

Office: P. O. Box 64, Colorado Springs, Colo. Works office: Takilma, Josephine Co., Ore. Chas. L. Tutt, Jr., pres.; Wm. T. Tutt, vice-pres.; J. A. Hull, sec.-treas.; C. E. Tucker, supt. Organized under laws of Colorado, capitalization \$250,000, shares \$10 par. Owns a controlling interest in the Waldo Smelting & Mining Co.

Lands, 175 acres, and a 160-acre smelter site, with total holdings of 335 acres, 320 acres patented, in the Waldo district, including the Queen of Bronze mine, showing diorite and serpentine, carrying several veins, with N.-S. strike, of which 3 are more or less developed.

The Queen of Bronze mine carries lenticular orebodies in diorite and serpentine that occur along vein fractures. The ore contains bornite and chalcopyrite, and is reported to average 8 to 15% copper with \$6 to \$10 in gold. Development includes a 150' shaft and tunnels of 200', 640' and 150' length, with several thousand feet of workings, estimated at last report to show 20,000 tons of oxidized and sulphide ores.

The smelter, at Takilma, has a 125-ton water-jacket blast furnace, making matte, when in blast averaging 45% copper, 2.5 oz. silver and \$2.50 gold per ton, that is shipped to the Tacoma smelter for conversion. The fuel supply is somewhat uncertain and in 1907 the works were compelled to import Japanese coke packed in 100-lb. bags. Owing to the heavy rains in fall and winter, causing impassable roads, the smelter could be worked only in summer. The nearest rail point is Grant's Pass, 42 miles distant, and when in commission the smelter employed 60 teams hauling out matte and hauling in coke and supplies. Equipment includes a sawmill.

Production was 7,543 tons of ore smelted yielding 1,563 tons of matte of about 45% copper tenor, indicating an average return of 8% copper from ore smelted, with production of about 1,350,000 lbs. fine copper in 1905, and 499,662 lbs. fine copper in 1907, the works being idle since Jan., 1908, owing to the death of the late Chas. L. Tutt.

TAM O'SHANTER MINING CO., LTD.

IDAHO

Mine near Osburn, Shoshone Co., Idaho. John H. Wourms, pres.; David C. Coates, sec.; Edw. Eisman, mgr.; preceding officers, P. J. Dills and Chas. Gamble, directors. Capitalization \$1,000,000, shares \$1 par.

Lands, 7 claims, between the Chester and Vortex groups, and near the Nellie mine, in the Evolution district, 1½ miles south of Osburn, the nearest rail point. The property shows a vein of 5 to 12' surface width, traceable 2,000', by numerous pits and trenches, carrying gray copper ore, with some silver-lead, ore shipped having returned up to 750 oz. silver per ton. Development is by a 50' shaft, showing an 18' vein, and there are 2 tunnels, a 210' drift tunnel showing a little gray copper ore assaying up to 18% copper and 200 oz. silver per ton. The main tunnel, 200' lower, is a crosscut about 900' long at last accounts. Is not considered as a likely copper, but rather a silver-lead property.

TAMARACK MINING CO.**MICHIGAN**

Office: 12 Ashburton Place, Boston, Mass. Mine office: Calumet, Mich. Works office: Hubbell, Houghton Co., Mich. Rodolphe L. Agassiz, pres.; Quincy A. Shaw, vice-pres.; Jas. MacNaughton, gen. mgr.; other directors, F. L. Higginson, R. S. Bradley, F. L. Whitcomb and E. C. Lewis; Geo. A. Flagg, sec.-treas.; Clarence H. Bissell, asst. sec.-treas.; John T. Been, supt.; Chas. D. Hohl, chief engr.; John T. Reeder, gen. clerk and purch. agt.; A. Lincoln Burgan, mill supt.; E. J. Waters, chief mg. capt.; John Rowe and Wm. Rosevear, mg. capts.

Organized 1882, under laws of Michigan, capitalization \$1,500,000, shares \$25 par. Dividends, begun 1888, were 43 in number, aggregating \$9,420,000 to end of 1913, last dividend having been \$4, July 23, 1907. The company sold its Cliff lands, 1910, for \$680,000 to the Cliff Mining Co., using the proceeds to liquidate the floating debt, interest on which was equivalent to 85 cts. per share, 1909. Balance sheet of Dec. 31, 1912, gave assets, exclusive of mining equipment, of \$1,500,152, with liabilities of \$379,290, leaving a balance of assets of \$1,120,862. Operations 1907-11 have given net annual losses, amounting to \$249,277 in 1907; \$172,246 in 1910; \$193,198 in 1911, and resulted in a profit of \$271,625 in 1912. Is controlled, through ownership of 19,400 shares of outstanding stock, by the Calumet & Hecla Mining Co. State Street Trust Co., Boston, registrar; Old Colony Trust Co., Boston, transfer agent. Annual meeting, first Wednesday in April.

Lands, 1,120 acres, in Secs. 10, 11, 14 and 15, T. 56 N., R. 33 W., with a mill site on Torch lake, miscellaneous timber lands and other realty giving total of 8,746 acres, from which the Cliff mine was sold, 1910.

The Tamarack mine proper is a tract of very irregular outline, bounded on all sides by lands of the Calumet & Hecla, and the mine is opened on the underlays of the Calumet conglomerate and Osceola amygdaloidal beds. The mine was planned by the late Capt. John Daniell, who conceived the idea of opening the underlay of the conglomerate by a deep vertical shaft. The actual work of sinking No. 1 shaft began 1882, and the conglomerate was cut 3½ years later, in 1885, at a depth only 10' greater than the estimate of Capt. Daniell made before the work was started.

Tamarack No. 1 shaft, 3,409' deep, cuts the Calumet conglomerate at 2,270' beneath the surface and the Osceola amygdaloid about 1,000' deeper. This shaft is used exclusively for hoisting water, raising approximately 13,000,000 gals. per month, all the water of the mine being diverted to this shaft, since at greater depth the amount of seepage is trivial. There are 2 Nordberg direct-connected duplex pumps on the 6th and 9 the levels, each are of capacity to lift 600 gals. per minute from the 9th level. Equipment at No. 1 includes a powerful hoist.

The Tamarack No. 2 shaft, N. E. of No. 1, is 4,355' deep, it has a double lining, the inner wall being braced against the outer by timbers of varying lengths which can be transferred or replaced from time to time, thus remedying the trouble caused by crushes or creeps. The ground began 1910, to show signs of crushing with a slight movement to the east. The conglomerate ground tributary to No. 2 shaft has been worked out, down to and including the 26th level, leaving the 27th to 30th levels, inclusive, still to be stoped. The pressure on the conglomerate is very great, requiring the installation of timber pillars in order to keep the drifts open.

The mine has 5 shafts, 2 at the South Tamarack, called No. 1 and No. 2, two at the North Tamarack, known as No. 3 and No. 4, with No. 5 shaft about midway between. The 16th level of No. 3 and the 38th in No. 5 are the same depth and are connected. The shafts are all connected for ventilation but the mine records show that the efficiency of miners measured

in tons of rock broken per man per diem, is only two-thirds as great in the Tamarack as in the adjoining Calumet & Hecla mine, having better ventilation.

Stopes are made with light timbering so that the workings will cave after ore extraction and sub-levels are opened with stope drifts 12x12' in size, rock chutes being used also, saving considerable timber. New openings have been 6,221' in 1907, 5,501' in 1910, 8,912' in 1911 and 2,656' in 1912. Average annual forces in 1912 were 796 men. Ore is mined from both the Calumet conglomerate and the Osceola amygdaloid.

As the Tamarack lands do not carry the outcrop of the copper lodes worked, but cover the "underlay," or downward continuation of the veins below the Calumet & Hecla workings, the Tamarack shafts are vertical and all levels must be opened by crosscuts, some of them at great depth, having a length of nearly one-third of a mile.

The mine is dry, though there was an increase in the inflow of water after the earthquake of 1905. A concrete dam has been built on the 34th level, to increase the storage capacity for water underground. The lowest level of the mine shows only a slight seepage of water, extremely bitter to the taste, shown by analysis to carry sodium and magnesium chlorides and bromides. The rock temperature, at a vertical depth of 5,000', is approximately 90° F., reduced somewhat by ventilation.

Tamarack No. 3 shaft, nearly a mile north of No. 1, is the principal shaft of the mine. It is 5,253' deep, and below this depth, only 27' less than 1 mile, is continued for 406' further as a blind shaft, sunk on the dip of the bed at the end of an 800' crosscut. This was done to save deepening of main shaft and the cost of crosscuts, constantly increasing in length. The incline blind shaft has a single track with stations on the 19th, 20th and 21st levels. It has a compressed air hoist, on the 18th level, which raises all rock to that point. The 18th level has shown only fair copper values. No. 3 shaft cuts the Calumet conglomerate at a vertical depth of 4,835' where the bed is 20 to 25' wide, but carrying irregularly-distributed copper, though payable as a rule. The shaft is connected with the Calumet & Hecla mine on the 17th level south and 39th level north. The mine has endless rope haulage on the 15th, 16th, 17th, 31st, 32nd and 35th levels. The normal output of No. 3 shaft is about 1,000 tons daily.

No. 3 shaft has an Allis-Chalmers hoist having a semi-conical drum with 18' maximum diameter. There is a 32x72" Nordberg auxiliary hoist used for lowering and raising men and timber in No. 4, with an 18' 6" drum having lathe-turned grooves for coiling the cable. Equipment at No. 3 shaft also includes a 60-h. p. fan, 10' in diameter, with blades 3' 6" wide, capable of supplying 192,000 cu. ft. of free air per minute, to the depth of the shaft, both ventilating and cooling the mine, which otherwise would be 90° F. in the bottom levels.

No. 4 shaft, 4,450' deep and about 600' N. E. of No. 3 is connected with the levels of No. 3 shaft for ventilation and safety. While occasional payable ground is shown, the section of the lode about the mine is as a whole poor.

No. 5 shaft, sunk about 3,300' S. W. of No. 4, and midway between the old Tamarack and North Tamarack workings, is the deepest and largest shaft of the mine, and is the only shaft that has been deepened for several years, ending 1912, with a vertical depth of 5,308', or a mile and 28'. Though No. 3 mine of the Tamarack has deeper openings, No. 5 is the deepest shaft sunk anywhere in the earth's crust. Sinking was begun Aug. 2, 1895, and the conglomerate was cut Dec. 20, 1901, at a vertical depth of 4,062', the late Capt. Wm. E. Parnall having foretold the depth within 12', and the time

required within 11 days, when the work was started, more than 6 years previously. No. 5 is connected underground with the workings of No. 2 and No. 3 shafts and its bottom is just below the footwall of the Osceola amygdaloidal bed.

In sinking this shaft, 83 separate trap, amygdaloidal and conglomerate strata, all barren, were cut, before the Calumet conglomerate was reached. The north drifts on the 35th, 36th and 37th levels have been carried to the Calumet & Hecla boundary and the 41st is the bottom level. Openings on the 40th level are in good copper ground though the showing on the 39th level is rather poor. The Osceola amygdaloidal bed shows no copper values except in a small streak along the hanging wall. The ground on the conglomerate bed tributary to this shaft is limited and though the conglomerate is of good width it is low in grade and shows constantly decreasing copper contents with depth.

As this shaft is the deepest mine shaft in the world the particulars concerning it are worthy of notice. The shaft is 7x29', inside measurement, with 5 compartments in a row. The 3 central compartments, 5x7' 2" each, are used for cages. One of the end compartments, also used for a cage, is 7' 2"x5' 4", the extra 4" being allowed for timber strain, while on the other side of the shaft there is a 3'x7' 2" compartment for ladders, pipes and wires. The 10x14" wall plates of this shaft are 29' 2" long, and the 5x7" runners, serving as guides for the cages, are 16 to 22' in length. Instead of lag screws being countersunk, the runners have a central groove 2" wide and 1½" deep running from top to bottom on both sides of each of the 4 hoisting compartments, these grooves providing for the escape of loosened lag screws, without damage to cages or runners. The shaft openings have automatic covers that lift for passage of the cages.

The shaft house and rock house at No. 5 are on separate foundations and are separately framed and braced although apparently standing as 1 building, 56x120' on the ground, with an extreme height of 131'. The foundations are exceptionally heavy and the girders and framing are of unusual strength to withstand the great strains caused by hoisting heavy cages and the operation of powerful rock-breaking machinery. In these buildings no wood is exposed, except in the floors, asbestos sheathing paper being used elsewhere to protect the wood, thus rendering the building practically fire-proof. The rock house has 3 Portage Lake crushers, of the reciprocating jaw type, with room for 5 more.

Surface equipment at No. 5 is the most extensive at any shaft of the property. The engine house has 2 duplicate 6,500-h. p. Nordberg hoists, each with four 36" high-pressure cylinders, having 72" stroke. The drums were 24' in diameter in the center tapering to 16' at the ends, each half carrying 6,500' of 1½" steel cable, the hoists, operating in counterbalance, being capable of raising from 6,000' depth a net load of 6 tons of rock, this having a gross weight, with cage and cable of about 12 tons. The hoists cost \$60,000 and \$90,000 respectively, and 1 hoist was made over, 1910, and given a 36' Nordberg drum, weighing upwards of 30 tons. The boiler house has six 200-h. p. Burt boilers, with 84" shells, and 2 115' brick-lined self-supporting steel smokestacks.

The compressor house at this shaft has a 35-drill Ingersoll-Sergeant and a 100-drill triple-expansion Nordberg compressor. The electric plant at No. 5 shaft has a 150-kw. generator supplying current to all branches of the mine.

The pumping station on the shore of Lake Superior, nearly 5 miles N. W. of the mine, has two 1,250,000-gal. pumps that take water from a 40' well, connecting with a tunnel driven 425' under the bed of the lake, the

intake being about 35' below water level. These pumps raise water against a static and frictional head of nearly 700', delivering it into steel tanks of 42' and 65' diameter, with combined storage capacity of 200,000 gals., standing on the highest ground at the mine. Water is distributed from these tanks to the Tamarack and Osceola locations.

The Tamarack has 2 stamp mills, on Torch lake a little more than a mile S. of the Calumet & Hecla mills, each with 5 compound heads and 2 simple heads, the latter being idle, as the 5 compound heads are capable of caring for all rock crushed at present. The mills have a combined daily capacity of about 3,500 tons of conglomerate rock, which is materially greater than any possible productive capacity of the mine. The stamp heads are fitted with 8" mortar grates, opening into one-quarter-inch mesh revolving screens, with Parnall-Krause hydraulic discharges. The stamps have accessory Nordberg crushing rolls, to care for raggings from the mortars, the rolls having rigid journals, with independent wash for each set. Mineral is dressed to about 50% copper.

No. 1 mill has Allis heads, 3 of which are compounded and has a steel trestle approach. No. 2 mill has Allis-Chalmers steeple compound stamps and is equipped with a traveling crane.

The joint pump house of the Tamarack and Osceola mills has two 40,000,000-gal. pumps and one 15,000,000-gal. pump. The 2 larger pumps, which are duplicates, have triple-expansion steam ends, with 22", 40" and 60" cylinders of 52" stroke, and the water end of each has three 30" plungers and a 42" discharge pipe. The foundation for the newest large pump is 25' deep, in solid sandstone.

The Tamarack and Osceola companies have joint wharves, and steel coal sheds, with 2 steel unloading towers, at Dollar Bay, on Portage lake, these being among the most extensive in the district.

Gross costs of mining and stamping per ton of rock, and gross cost of finished copper per pound, have been as follows:

Year	Cost per ton	Cost per lb. cts.	Year	Cost per ton	Cost per lb. cts.
1903.....	\$2.32	11.50	1908.....	\$2.57	15.24
1904.....	2.42	12.98	1909.....	2.44	14.30
1905.....	2.39	13.37	1910.....	2.67	14.70
1906.....	3.62	14.37	1911.....	2.69	15.56
1907.....	3.28	15.82	1912.....	2.23	13.15

Maximum production was 20,222,529 lbs. fine copper in 1897. Recent production has been:

Year	Lbs. Copper	Year	Lbs. Copper
1903.....	15,286,093	1908.....	12,806,127
1904.....	14,961,885	1909.....	13,533,207
1905.....	15,824,008	1910.....	11,063,606
1906.....	9,832,644	1911.....	7,494,077
1907.....	11,078,604	1912.....	7,908,745

The Tamarack always has been an expensive mine to work, and unavoidably must continue such, with expenses increasing by reason of depth and decreased mineral values. As it stands the Tamarack mine saw its best years before the opening of the twentieth century.

TAMARACK-OSCEOLA COPPER MFG. CO.

MICHIGAN

In liquidation. Entire assets consisting of a wire and sheet mill at Dollar Bay, Houghton Co., Mich., were sold, 1912, to John A. Roebling's Sons Co. for \$180,000.

TANK PASS CONSOLIDATED MINING CO.

ARIZONA

Office: care Reginald C. Pryor, Houghton, Mich. Mine near Salome,

Yuma Co., Ariz. A. Tennyson Pryor, pres. and gen. mgr.; Ward Smith, vice-pres.; Wm. D. Calverley, sec.-treas. Organized Nov., 1909, capitalization \$3,000,000, shares \$10 par. Company controls the Alvin Development Co. through stock ownership, and took over the property of the Cobralla Copper Co., March, 1910.

Lands, known as the Ultimatum or Cobralla group, adjoin the Alvin, near Tank Pass in the Harcuvar mountains, Ellsworth mining district, about 10 miles from Wenden. The property carries about 4,500' of the strike of various fractures in a contact zone following granite intrusive in quartzite, amphibolite and limestone, the ores carrying bornite and chalcopyrite, and estimated to average 3 to 5% copper, 5 to 6 oz. silver and \$1 to \$8 gold per ton, with occasional paystreaks and masses of high-grade ore. Development is by the 150' Carbonate Hill shaft and a 200' tunnel. Equipment includes a gasoline hoist. Idle for several years past but considered worthy of further prospect work.

TASMANIA COPPER MINING & MILLING CO. COLORADO

Letters neither answered or returned from 603 Provident Bldg., Philadelphia, Pa. Mine office: Winfield, Chaffee Co., Colo. D. B. Dance, vice-pres.; G. Albert Smyth, sec.; Edw. O. McHenry, treas. Organized April 20, 1898, under laws of Colorado, capitalization \$1,000,000, shares \$1 par. Lands, 13 claims, 250 acres, in the La Plata district, with about one-half mile of underground openings, estimated to show 750,000 tons of auriferous and argentiferous galena, sphalerite and chalcopyrite. Has a 25-ton pyritic smelter.

TASSOO MINING & SMELTING CO., LTD. BRITISH COLUMBIA

Mine office: Jedway, Queen Charlotte islands, B. C. Lands, 12 claims, 850 acres, including a town site on the S. W. side of Tassoo harbor, W. side of Moresby island. The mine is accessible by steamer direct, or by 5-mile trail from Sewell. Property shows granite cutting limestone, with diabase and trap dikes in both rocks. The ore deposits, in limestone, consist of magnetite containing 62% iron, 2% copper, 1% lime and 3% silica. The orebody is 107' wide, with 56' of 2.5% ore, balance 1.55% and 23' more of 1%. A 280' adit tunnel, at 1,130' elevation, cuts the orebody. A Vancouver syndicate was preparing to develop this property, 1913.

TAYLOR MOUNTAIN MINING CO. COLORADO

Office: 609 New York Life Bldg., Omaha, Neb. Operating office: Salida, Colo. Mine office: Garfield, Chaffee Co., Colo. W. F. Norway, pres.; C. S. Montgomery, sec.; Geo. H. Purmort, supt. Organized Oct., 1905, under laws of Colorado, capitalization \$600,000, shares \$1 par. Annual meeting, in November.

Property consists of the Lily mine, with 7 claims, 65 acres, in the Monarch district, 1½ miles from Garfield and 19 miles from Salida. The property shows a nearly vertical N.-S. contact vein, between granite and limestone, carrying lead and copper ores. The mine shows a little lead carbonate ore assaying 20% lead, 75 to 180 oz. silver and \$6 gold per ton, besides copper ore which the management estimates will average 10% copper, 8 oz. silver and \$1 gold per ton. Has shipped 100 tons of 12% copper ore. Development is by a 280' main shaft, with 4,000' of workings.

Equipment includes electric power with 16-h. p. hoist and 35-h. p. General Electric air compressor. Buildings include an engine house, smithy, carpenter shop. The mine employed about 25 men at last report.

TECOLOTE COPPER CO. MEXICO

Owned by the West Coast Smelting & Refining Co. and property described under that title.

TEDDY MINING & MILLING CO., LTD. IDAHO

Idle. Office and mine: Kellogg, Shoshone Co., Idaho. J. B. Cox, sec.;

John Pelkes, supt., at last accounts; J. L. Safford, cons. engr. Capitalization \$1,000,000, shares \$1 par. Lands, 7 claims and a mill site, 1 mile E. of Kellogg, show 2 veins, 1 of about 15' width carrying copper ore with quartz gangue, and 1 of about 12 to 35' width carrying silver-lead ore giving assays up to 12% lead and 30 oz. silver per ton. Development is by crosscut tunnels of 100' and 550'. There are several mine buildings. No returns secured.

TEJON MINING CO.

ARIZONA

Office: Bakersfield, Cal. L. I. Thiers, superintendent, Gleeson, Cochise, Ariz. Property, a group of claims at Gleeson, in the Turquoise or Courtland district, Ariz., which adjoin the Copper Belle mine of the Leonard Copper Co. Property shows heavy bedded limestone dipping steeply eastward into the mountain ridge and cut by intrusive bodies of monzonite and later quartz porphyry. Ore occurs as replacements in large but irregular masses. It is a heavy pyrite, low in copper, with some high-grade oxidized ore in caves and open fissures.

Development is by the 800' Tejon shaft, crosscuts and levels and by several old tunnels with extensive drifts and stopes in oxidized ore.

Equipment, modern and complete, includes electric and steam power, compressor, etc. Railway is close at hand. Property appears meritorious and management good.

TEMPLE MINING CO., LTD.

IDAHO

Dormant. Office: Wallace, Idaho. Mine near Burke, Shoshone Co., Idaho. Louis H. Hays, pres.; John Stambaugh, vice-pres.; Geo. Edmiston, sec.; Thos. Scott, gen. mgr., at last accounts. Stock is assessable. Lands, near the Great Western mine, are developed by 2 tunnels, the lower showing lead and copper ores, with quartz gangue, giving assays up to 20% copper.

TENABO MINING & SMELTING CO.

NEVADA

Office: 105 Mercantile Bldg., Salt Lake City, Utah. Mine address: care A. E. Raleigh, supt., Tenabo, Lander Co., Nev. W. Mont Ferry, pres.; John Pingree, vice-pres.; John Janney, sec.; E. O. Howard, treas., and Benner X. Smith, directors; Duncan MacVichie, cons. engr. Organized 1909, under laws of Nevada, capitalization \$3,000,000, shares \$2 par; issued \$1,922,156. Annual meeting, second Monday in February. Union Trust Co., New York, registrar; Windsor Trust Co., New York, transfer agent; Walker Bros. Bank, Salt Lake City, depository. Stock is listed on the unqualified department of the Boston curb.

Company bought, 1909, the property of the Gem Consolidated Mining Co., at Tenabo, which in turn had taken over the property of the Reliance Mining & Milling Co., the Tenabo Mining & Smelting Co. giving 450,000 shares of stock to the Gem Consolidated for the lands. Company also bought the property of the Tenabo Consolidated Mines Co., comprising the Copper Hill and Widows mines, for 300,000 shares of stock.

Lands are 223 acres of mineral lands and an 80-acre mill and smelter site. Lands are in 4 groups, all with more or less development work.

The principal group shows a deposit of low-grade copper ore, stated by company to average 300' in width, outcropping for nearly a mile, with indications, of making a mine similar to that of the Utah Copper Co., at Bingham. The management estimates the ore on this group to run about 3% copper, with small gold and silver values.

The Little Gem mine, about 1 mile from Tenabo, has a contact deposit between rhyolite and sedimentary rocks, carrying copper carbonates and chalcopryite, with quartz gangue, a 450' shaft, sunk at the very flat angle of 22°, showing an orebody ranging from 2 to 14' in width, giving assays up to 31.1% copper, 122 oz. silver and \$9.60 gold per ton. Mine is estimated to have 24,884 tons blocked out, that will average \$18 per ton.

The property was acquired upon a report in 1908 by Duncan MacVichie that it contained 7,783 tons of \$13.38 smelting ore and 17,257 tons of \$3.88 concentrating ore and that \$25,000 spent on the property would bring reserves up to 100,000 tons.

Another property has a 150' incline shaft, in a vein, apparently widening in depth with 5 parallel veins in a cross-section of about 600'.

The property as a whole has about 3,000' of workings, and about \$100,000 has been expended in development and equipment. Capt. MacVichie estimates \$479,000 worth of ore blocked out in the Gem mine alone and that the expenditure of a few thousand dollars additional would increase this amount of developed ore to \$1,840,000 in value, or more at the present metal prices. Company shipped 23 cars of ore, from the Little Gem mine, with gross smelter returns of \$23,774, and net smelter returns, after deducting freight, sampling and smelting charges, of \$17,640.

Equipment includes 2 gasoline hoists and company plans erecting a mill. About 35 men employed doing development work in 1912 and 1913.

Property considered promising but finances do not permit rapid development to fit it for production.

TENAS MINING CO.

WASHINGTON

Idle. Office: 320 California Bldg., Tacoma, Pierce Co., Wash. Mine near Keller, Ferry Co., Wash. J. R. Turner, pres.; P. J. Sweeney, vice-pres.; C. E. Peterson, sec.; D. McPherson, treas.; preceding officers, Otto B. Roeder and F. W. Heide, directors, all of Tacoma, Wash. Organized Sept., 1910, under laws of Washington, succeeding the Iconoclast Consolidated Mines Co., whose property was sold for debt; capitalization \$10,000, shares \$1 par, fully paid and assessable up to 25% per year; issued, 3,448. Assessments to date 32%.

Lands, 5 claims, 95 acres, relocated 1912, 2 miles N. of Keller, show 3 contact deposits with an orebody 30' in maximum width, giving average assays of 3.6% copper and 2 oz. silver per ton with some gold. Development is by a 325' main shaft and 3 tunnels with claimed total length of 514'. Annual assessment work only has been done since 1908. Company is a holding corporation, awaiting an opportunity to sell or bond the property.

TENDROY MINE.

IDAHO

Address: Salmon, Lemhi Co., Idaho. Property, 2 miles N. of the Queen of the Hills mine, at head of Wallace creek, near contact between granite and Algonkian slate series. Claims show 2 veins of gold-copper ore developed by 400' of tunnel work. A 2-stamp Nissen mill on the property has treated a small amount of ore.

TENNESSEE COPPER CO.

TENNESSEE

Office: 2 Rector St., New York. Mine at Copperhill, Polk Co., Tenn. Jas. Phillips, Jr., pres.; E. H. Westlake, vice-pres.; Walter M. Briggs, sec.-treas., preceding officers, Wm. B. Thompson, A. R. Peacock, W. A. Neereamer, S. J. Jennings, G. W. Breen, Jos. Walker, Jr., F. Felix Rosen, Utley Wedge, Richard Sutro and H. M. Kilborn, directors; J. B. Risque, mgr.; M. A. Caine, mine supt.; A. J. Bone, smelter supt.; D. F. Dryden, acid plant supt.; Utley Wedge, cons. engr.; A. M. Failie, assayer; Chas. A. Magnell, purch. agt.

Organized April 26, 1899, under laws of New Jersey, capitalization \$5,000,000, shares \$25 par; fully issued. Debentures \$1,500,000, fully issued; \$300,000 paid. State Street Trust Co., Boston and Equitable Trust Co., New York, registrars; Old Colony Trust Co., Boston and National City Bank of New York, transfer agents. Stock listed on New York, Boston and London exchanges. Annual meeting, fourth Thursday in February.

Net profits and dividends have been as follows, the first figure being the

profits and the last the dividends for each year: \$417,565 and \$218,750 in 1903; \$186,966 and \$218,750 in 1904; \$452,106 and \$218,750 in 1905; \$824,231 and \$250,000 in 1906; \$800,634 and \$650,000 in 1907; \$324,768 and \$500,000 in 1908; \$339,406 and \$250,000 in 1909; \$445,387 profits, without dividends, in 1910, but a dividend of \$1.50 per share, amounting to \$300,000, declared Dec., 1910, was paid Jan. 26, 1911; \$2.50, or \$500,000 in 1912 and \$3 to Dec. 1, 1913. Total dividends to Dec. 1, 1913, \$19.00. Net profit for 1912, \$1,095,875.

In 1912, the company's bonded indebtedness was reduced to \$1,200,000. Besides paying \$150,000 on this account, \$100,000 was added to the reserve for plant depreciation, \$50,000 for special depreciation and \$150,000 was added to the surplus reserve account. At the annual meeting, Feb., 1913, the control of the property passed from the Lewisohns, who organized the company and brought the property to its present efficient state, to a new management with James Phillips, Jr., as president and a board currently supposed to represent Standard Oil interests.

Property comprises 2,080 acres of mineral land and 11,000 acres of miscellaneous lands, in the Ducktown district. Ore was discovered and mining first begun in 1850, and the mines were operated regularly by a New York company previous to the Civil War, and, during the earlier part of the war, under compulsion by the Confederate Government to supply copper for munitions of war. Company owns the Burra Burra, London, Polk County, Eureka and Tennessee mines. The Eureka was formerly operated under lease for iron ore by the Virginia Iron, Coal & Coke Co., yielding 39,498 long tons of iron ore, 1907.

The property shows pre-Cambrian metamorphosed mica-schist, carrying several lines of mineralization with lenticular orebodies. Four deposits, under development, show extensive gossans, originally having a little rich sooty glance ore under the gossan, which was mined out many years ago. The lenses range 30 to 70' in width, 500 to 2,000' in length, and are of unknown depth. The ore consists of a massive mixture of pyrite and pyrrhotite, with a little chalcopyrite, in a gangue of various metamorphic minerals and quartz, ore ranging from 2 to 4% copper, 40% iron, 27% sulphur and 15% silica, with minute quantities of gold and silver. As zinc and other refractory elements are lacking the ore is excellently adapted to smelting, giving very clean slags.

The mines are extensively developed, the new work for 1910 including 2,898' of level workings, and 5,058' of diamond drilling amounting to 2,717' in 1912, including 1,196' of diamond-drill holes and 655' of winze and raise work. Levels are spaced 100' apart. In order to conserve the sulphur content of the ore, which is valuable for acid making, the company's old mines were worked on a smaller scale than usual, 1910.

Ore reserves, Dec. 31, 1912: 3,691,000 tons of available ore, with 1,380,000 tons of probable ore, giving a total of 5,071,000 tons.

The Burra Burra mine, which is the principal property, is operated through an 800' main central, sunk at 75° in the footwall, having its first level 170' below the collar, with succeeding levels at 100' intervals, the mine ending 1910, with 6 producing levels, the 7th level under development and the shaft sinking for the 9th level.

The method of back stoping adopted in 1912 met expectations and over 60% of the 1912 tonnage from back stopes in this mine and over 65,000 tons of broken ore was in the stopes, Dec., 1912.

The main orebody of the Burra Burra is 1,200' long and averages 60' wide on the 3rd level. There also is the north or McPherson orebody, developed by a drift from the 3rd level of the main shaft, connecting with the old McPherson shaft, 2,200' N. E. of the main shaft, the McPherson orebody

being about 900' long with an average width of 25'. The Hiwassee shaft, 900' S. W. of the main Burra shaft, is sunk to the 3rd level, showing a comparatively small orebody, of about 200' length and 12' average width. Burra Burra produced 298,348 tons of ore in 1912.

• The London mine has a 600' shaft, sunk at an incline of 75°, with 6 levels opened, developing an orebody of 25 to 75' width and about 600' length, ranging 2 to 4% in copper tenor. The London produced 98,917 tons of ore in 1912.

The Polk County mine has a 485' vertical shaft, with 5 levels opened, developing an orebody of very irregular shape, up to 120' maximum width, of about 2% average copper tenor. Production of the Polk County mine was 45,773 tons of ore, 1912.

In 1912, company took a 25-year lease on the School property, an extensive orebody developed by an open cut about 3,500' long, from which the iron ore, or gossan has been removed down to the sulphides. Property is being explored by diamond drill.

The Eureka mine, idle in 1912, has a shaft sunk 1910, to depth of 165', at which point the first level will be opened. Diamond-drill borings have shown an orebody of 20 to 165' width, by about 1,000' length, and it is estimated that this mine has 2,500,000 tons of ore developed that average 44% iron, 36% sulphur and about 1% copper. This ore is to be treated in 1914 for its iron and sulphur, as experiments indicate that the ore will make a good non-phosphorus iron ore. An initial unit to try out the process is planned.

Equipment at the Burra Burra includes a combination shaft house and crusher building, 127' long, containing the crushing plant. Equipment includes an 18x36" Blake crusher, feeding to a 36"x33" Robins belt conveyor, used as a picking belt, which discharges into storage bins of about 2,500 tons capacity, and as far as possible all barren rock is removed from the crushed ore by hand picking. The crushing plant includes 42x14" screens and a 180-h. p. engine, the plant having a daily crushing and assorting capacity of 2,000 tons, ore being reduced to 4" size. There are similar shaft rock houses at the London and Polk County mines.

The brick power plant at the Burra Burra includes four 150-h. p. Babcock & Wilcox boilers, having Murphy automatic stokers. An 18x42" Nordberg first-motion duplex hoist has two conical drums, each of 7' minimum and 9' maximum diameter, with 5' face, raising 5-ton skips with 1½" steel cables. There also is a man car, similar to those of the Lake Superior district. There are 2 Nordberg 2-stage air compressors, each capable of reducing 2,000 cu. ft. of free air per minute to 70 lbs. initial pressure. A small plant furnishes electric light for the Burra Burra and London mines.

The company's private railway connects all of the mines with the works and has connection at Copperhill with the Louisville & Nashville railway, where there is a central yard for interchange of traffic. The track is of standard gauge, with 7½ miles of main line and 4½ miles of sidings and spurs. Equipment includes four 105,000-lb. Schenectady locomotives, 50 thirty-ton Rogers ballast ore cars, 10 gondolas and 11 miscellaneous cars. The company has a repair shop for locomotives and cars, equipped for making all repairs and capable of completely rebuilding when necessary. This line, in 1912, handled 648,480 net tons in the company's cars, and 488,654 tons in foreign cars.

The smelter at Copperhill, a little N. of the Tennessee mine and 1 to 5 miles from the other mines of the company, was designed and built by J. Parke Channing. On the upper level are the ore bins, having storage capacity for 10,000 tons of ore, 800 tons of coke, and necessary fluxes and furnace

products requiring retreatment. Charges are drawn from the bins into cars of 44 cu. ft. capacity, hauled by electric locomotives, there being scales for weighing charges, and 4 tracks that run under the bins and circle around the furnaces, so that a train loaded on any track may go to any furnace and return to the bins.

An ore-bedding system of the Messiter type was completed and put in operation, 1911. Belts receive ore from the railway bins, passing it through the sampling mill to the beds, of which there are 2 for ore, of 10,000 tons capacity each, and 2 for matte, of 3,500 tons each. Ore is reclaimed by 2 machines, which send it by belts to the charge-floor where the charges are measured and sent in regular charge cars to the furnaces.

Dust is removed from the chamber by two 12" conveyor belts running in the tunnel underneath and treated in a sintering plant. This plant, rebuilt in 1912, has two 42x264" Dwight-Lloyd machines, producing over 1,000 tons of sinter coke monthly, part of the flue dust is spread over the beds and covered with low-grade first-fusion matte, the product being a light porous material in excellent condition for resmelting.

The furnace building of steel has 7 blast furnaces, 3 being 56x180" and 4 being 56x270" at the tuyeres, with a height from tuyeres to charge-floor of 18', and from tuyeres to the cast-iron water-cooled sole plates of 42". Each blast furnace has a 16' circular settler lined with low-grade silicious copper ore, which has replaced fire brick. Slags skim into pots of 105 cu. ft. capacity, which are hauled by electric locomotives, considerable slag being used for railway ballast. There is a 25-ton refining furnace.

The converter department has two 40-ton electric traveling cranes taking matte from the settlers to the converters, 4 stands and 15 shells, each 84x126", of the Leghorn type. The converters were changed, 1912, from acid to basic lining which necessitated the drying of silicious material. For this purpose a Ruggles-Coles dryer, with necessary bins and conveying belts, was installed.

Hot converter slag is poured into the blast furnace settlers, by reason of which the only converter slags requiring resmelting are the skulls forming in the ladles. Converter bars average about 99.4% in copper tenor, and formerly were shipped mainly to Europe as blister copper without electrolytic refining, but copper is now cast in 210-lb. pigs and sent to the Baltimore Copper Smelting & Rolling Co. for electrolytic refining, which effects the saving of the very small gold and silver values contained. The finished electrolytic copper is marketed through the American Smelting & Refining Co.

The smelter power house is of steel frame with brick walls. Equipment includes two 250-kw. 500-volt d. c. Westinghouse generators, direct-connected to 2 Nordberg tandem-compound Corliss engines, and one 400-kw. 500-volt d. c. Crocker-Wheeler generator, driven by a Bates tandem-compound Corliss engine, all 3 engines running non-condensing, with exhaust steam going to a feedwater heater. Furnace blast is supplied by 3 Nordberg piston blowing engines, each of 20,000 cu. ft. capacity per minute, and 3 Nordberg duplex cross-compound piston blowing engines, each of 30,000 cu. ft. capacity per minute, having 15x33x42" cylinders, with 70x42" air ends. These engines supply blast at 50 oz. pressure to a common blast-main, above the charge floor. Converter blast is furnished by 2 Nordberg duplex cross-compound air compressors, supplying 10,000 cu. ft. per minute each, at 12 lbs. initial pressure. An Ingersoll-Rand air compressor furnishes air at 100 lbs. pressure for operating the charging doors and sundry pneumatic tools. The electric plant includes a 110-kw. 250-volt Keystone generator, direct-connected to a Ball tandem-compound engine furnishing current for electric

light, and there is a motor-generator set for transforming a 500-volt current to 220-volt current for electric lighting outside of the power plant. The engine house has a complete oiling system which is effecting a considerable economy in oil consumption and reducing the cost of repairs.

The smelter boiler house has four 512-h. p. Altman & Taylor water-tube boilers, with Murphy automatic stokers and Foster superheaters, delivering steam at 175 lbs. pressure, with 150° superheat. Coal and ashes are handled mechanically by a bucket and chain conveyor, an 800-ton steel coal bunker being located to feed automatically to the boilers.

The shop equipment is very complete, there being machine, pipe, plate, pattern, carpenter and paint shops, with smithy and foundry having 1 cupola for iron castings and another for brass and lead, with an autogeneous welding outfit. All repairs for the mine and works are made in these shops.

Water supply is pumped from the Ocoee river by two 10" 2-stage Worthington pumps, belt-driven by motors, each with capacity of 2,800 gals. per minute, to large storage tanks above the smelter, and a large reservoir at the McPherson shaft, built, 1912. A 4,000,000-gal. reservoir at about the level of the furnace floor received the flow from the water-jackets, which passes over a Worthington water-cooling tower.

The company operates a quartz quarry at Austral, Tenn., 35 miles N. of Copperhill, on the Louisville & Nashville railway. Equipment of the quarry consists of a boiler, air compressor, rock drills and a Bucyrus steam shovel. The production of this quarry was 48,000 tons in 1910. The mines and smelter employ a total of 1315 men.

Much damage was done to farms and forests by the sulphur fumes from the works of the company but this was materially reduced by the discontinuance of heap-roasting, and the substitution of semi-pyritic smelting. A certain amount of deleterious fumes continued, even after the change to semi-pyritic smelting, and meanwhile, the matter had been taken into the courts. An already delicate situation was further complicated by the peculiar geographical location of the works, which stand in the extreme S. E. corner of the state of Tennessee, the prevailing winds carrying the bulk of the fumes into the state of Georgia, by reason of which the state authorities of Georgia brought suit against the Tennessee Copper Co., in the Federal courts, and the latter decided that the smelter must eat its smoke. Bad as this decision seemed at first, it has been transformed from a curse into a blessing through the installation of a mammoth sulphuric acid plant. This undertaking, which at first seemed merely a matter of considerable outlay, proved much more difficult than was anticipated by reason of the intermittent and varying nature of the gas supply from the blast furnace tops. The problem has been solved successfully, after no little research, experimentation and worry, accomplished by a large expenditure of money.

The acid plant, which has cost considerably upwards of \$1,600,000, was begun 1906, and completed 1907, but was not put into full operation until early 1908, when the rated capacity was 120,000 tons yearly of 60° Beaumé chamber acid, and the plant has been enlarged since to a nominal capacity of 180,000 tons yearly, with actual capacity somewhat greater. Two Gay-Lussac towers, Nos. 9 and 10, put in operation 1911, proved successful and a new tower was built, 1912. Production was 192,084 tons of 60° Beaumé in 1912.

As the furnace gases contain sulphur dioxide, sulphur trioxide, carbon dioxide, oxygen and nitrogen in considerably varying percentages, new methods of control were found necessary to maintain the volume of sulphurous gases suitable for making sulphuric acid by the chamber process. After some experimentation the problem was solved by equipping 1 of the smaller

and 3 of the larger blast furnaces with tight tops, above the charge floor, to exclude atmospheric air, these being connected with a dust chamber 26x36x163' in size, where most of the solid matter is precipitated from the gas, the dust chamber being so constructed as to conserve the heat of the gases sufficiently to concentrate the acid in the Glover towers. There are 2 octagonal Glover towers of 30' diameter and 50' height with suitable nitre plants at the foot of each. After passing through the towers the gases are conducted through very large lead flues of 200 sq. ft. sectional area, which deliver the fumes to the chamber system containing 4,600,000 cu. ft. of chamber space. In a general way the chamber plant is of conventional design, yet the enormous quantities of fumes received and acid produced have brought about developments that are quite new to the industry, among the most notable being the size of gas connections, acid lines, acid coolers and fans, which are all on a scale never before known. The discharge from the chamber plant is conducted into 11 Gay-Lussac towers, which also are of a gigantic size hitherto unknown, the 2 latest and largest being octagonal of 36' diameter and 65' height. The estimated capacity of 180,000 tons per year of 60° Beaumé chamber acid is now demonstrated to be low. The company has contracted for the sale of its entire production of sulphuric acid and for an even larger output of acid than 200,000 tons yearly, for a period of 10 years, to the International Agricultural Corporation, at a price understood to be \$3 per ton and received very considerable bonuses under this contract. The acid production was 25,000 tons in 1908, nearly 50,000 tons in 1909, above 192,000 tons in 1912 and is expected to reach 200,000 tons in 1913. This mammoth acid plant, the largest and most complete in existence, requires a force of only about 30 men for its operation.

Production has been as follows: 1,948,759 lbs. fine copper in 1901; 7,961,734 lbs. in 1902; 10,690,389 lbs. in 1903; 8,617,697 lbs. in 1904; 7,977,982 lbs. in 1905; 11,319,591 lbs. in 1906; 12,599,019 lbs. fine copper, 14,905 oz. silver and 85 oz. gold in 1907; 14,464,585 lbs. fine copper in 1908; 14,058,954 lbs. in 1909; 12,429,009 lbs. in 1910; 13,808,940 lbs. fine copper in 1911; 13,252,634 lbs. fine copper, 50,622 oz. silver and 337 oz. gold in 1912. In addition to this production from the company's own ores, the smelter produced 4,406,423 lbs. copper from custom ores.

The output for 6 months in 1913 totals 9,415,705 lbs. copper; sulphuric acid production, 97,546 tons.

Cost of finished copper was 8.08 cts. per lb. in 1905, 11.79 cts. in 1907, 10.64 cts. in 1910 and 11 cts. in 1912. Costs per ton of ore treated were \$2.81 in 1905, \$3.37 in 1907, \$3.12 in 1910 and \$2.88 in 1912, or 9.65 cts. per lb. of copper. The ore treated yielded an average extraction of 29.3 lbs. copper per ton in 1910, 31.6 lbs. in 1911 and 29.8 in 1912, the lower figure being due to the idleness of the sintering plant during rebuilding.

Low-grade copper ores are treated profitably at other points, but in nearly all other cases there are considerable gold and silver values, which are lacking in the case of the Tennessee. This company has shown both courage and ability in changing the old method of semi-pyritic smelting, and has shown equal ability and greater courage in the installation of its acid plant, by virtue of which a very serious handicap has been turned into a permanent source of large revenue. The property is managed with great business ability and technical skill, and its annual reports are unusually complete and satisfactory, giving detailed figures that are thorough and furnish the shareholders and others interested with ample material for an adequate understanding of the company's resources, operations and results.

TENNESSEE MINE.

ARIZONA

Near Chloride, Mohave Co., Ariz. Mine contains mostly lead ore, but

development on the 900' level has opened up an oreshoot averaging 5% copper, according to reports. Shipping about 100 tons daily to the Needles smelter. No returns secured.

TENNESSEE MINING & MILLING CO.

COLORADO

Office: care J. W. Thayer, sec., 677 Roscoe Blvd., Chicago, Ill. Mine office: Empire, Clear Creek Co., Colo. J. W. Looffbrouw, pres.; S. B. Anderson, vice-pres.; J. F. Kidnell, treas., and H. J. Fersdick, directors; Abel Guion, supt. Organized Feb. 11, 1911, under laws of Colorado, capitalization \$400,000, shares \$1 par, nonassessable; issued 260,000. Annual meeting, Aug. 13. Company is a reorganization of the Gold Bug Mining Co.

Property, 6 claims, 2 deeded, in the Colorado district, 1¼ miles from Colorado Southern railroad. Claims have veins which show gold and silver ore with traces of copper. Management expects to erect a mill, as it estimates enough ore blocked out by 3,000' underground development to keep a small mill busy. Production for 1913 reported by company as \$1,500.

TERNERES MINE.

MEXICO

Owned by Velardeña Mining & Smelting Co., at Velardeña, Durango, Mexico.

TERRA NOVA PROPERTIES, LTD.

NEWFOUNDLAND

Secretary and office: E. A. Swisham, Fleetway House, Farrington St., London, Eng. Mine address: Millertown, Newfoundland. Mayson M. Beeton, chairman; William Scott, supt., at Grand Falls, Newfoundland; preceding officers, directors. Is a subsidiary of the Anglo-Newfoundland Development Co. Company owns rights over about 2,500 sq. miles, held by 99 year lease, in the central part of Newfoundland, surrounding Long lake. The principal property is Buchan's River mine, about 5 miles W. of the lake on the N. shore. Ore occurs in sericitic schists formed of volcanic grites, the vein having strike of N. 51° E. and dipping about 30°.

Development consists of a 370' shaft with several levels, having long drifts on the vein. The one orebody thus far found varies from 5 to 10' in thickness, is 350' long, horizontally, and 370' in downward extension. The ore is a complex sulphide carrying 2.36% copper, 8.14% lead, 20.38% zinc, 6.70 oz. silver and \$2.72 gold per ton.

Property closed down for the present pending determination of cheap method of treatment.

TESORA; MINA EL.

MEXICO

Office and mine: Calmallí, Baja California, Mex. Emilano Ybarra, owner and manager. Property carries highly auriferous and argentiferous copper ores, and is equipped with a small steam plant and a 10-stamp mill. Employed about 25 men, at last accounts. Probably idle, owing to revolution.

TESORA DE SONORA MINING CO.

MEXICO

Letter unclaimed at Kemper Bldg., Kansas City, Mo. Mine at Suaqui de Batuc, Ures, Sonora, Mex. Dr. J. C. Rogers, pres.; J. B. Hinthorn, vice-pres.; Geo. L. Hines, sec.; Geo. E. Wittich, treas.; Stanley F. Mers, supt. Organized 1905, under laws of Arizona, capitalization \$5,000,000, shares \$1 par, and holds title to lands through ownership of entire capital stock of the National-Wardwick Consolidated Mining Co., S. A., organized under laws of Mexico.

Property, the Nacional and Wardwick mines with 360 hectares mineral lands, 830 acres, in 2 groups, 1 mile from the Yaqui river and 9 miles from Suaqui de Batuc, latter including the Todos Santos mine, an antigua once having a smelter, as evidenced by a large slag dump. Claims show ore-bearing fissures in limestone with replacement deposits of copper and silver-lead ores. The old workings were shallow, only oxidized ores having been

mined and smelted, but the property is said to have been a considerable producer long ago. The mine shows a 75' silver-lead orebody carrying oxidized and sulphide ores, and has yielded ore assaying 28.7% copper, 2.8% lead and 139 oz. silver per ton. La Nacional mine has the 75' Mendosa tunnel, and a 65' shaft, claimed to have yielded 150 tons of ore of \$19.31 average assay value. No recent returns secured.

TETER-STONE AZURITE MINING CO.

ARIZONA

Mine office: Dragoon, Cochise Co., Ariz. Dr. D. W. Teter, pres.; Geo. A. Brown, supt. Lands, 3 miles south of Dragoon, have a 4 to 10' contact deposit, between limestone and granite, showing outcrops of azurite and malachite, with sulphide ore shown in a tunnel. Developing 1913, but operations hindered by a heavy inflow of water.

TEXAS-ARIZONA MINING CO.

ARIZONA

Mine office: Dragoon, Cochise Co., Ariz. J. Q. Marrion, pres.; J. R. Hubbard, gen. mgr. Property near the Centurion mine, about 20 miles from Dragoon, in the Castle Dome mountains. Mine has a shallow incline shaft and a 200' vertical shaft showing silver-lead and copper ores with small copper values. The company is shipping regularly to El Paso, having recently encountered high-grade ore on the 200' level.

TEXAS COPPER CO.

ARIZONA

Probably idle. Mine, 20 miles N. W. of Tucson, Pima Co., Ariz. Chas. E. Hoff, president and manager. Capitalization \$3,000,000, shares \$1 par. Lands, 3 claims, unpatented, 60 acres, one-half mile N. of the Gould mine, in the Amole district, show fissure veins in volcanic rocks, developed by a 35' shaft and a 140' tunnel. Workings expose a strong iron gossan with copper stains.

TEXAS GROUP.

ARIZONA

Eight claims, near Douglas, Cochise Co., Ariz. Formerly owned by August Baron, sold 1913, to Tennessee interests. Property said to carry copper, silver-lead and zinc ores.

TEXAS TURQUOISE MINING CO.

TEXAS

Address: A. D. Hudson, owner, El Paso, Texas. Mine, 2 miles W. of Van Horn, Texas, is a producer of turquoise and copper minerals, showing evidence of making a copper mine when gems are exhausted.

TEZIUTLÁN COPPER CO.

MEXICO

Organized under laws of New Jersey, capitalization \$1,000,000, shares \$100 par. Is controlled, through ownership of entire stock issue, by Teziutlán Copper Mining & Smelting Co. Fully described Vol. V.

TEZIUTLÁN COPPER MINING & SMELTING CO.

MEXICO

Office: R. E. Safford, sec., 82 Beaver St., New York. Mine office: La Aurora, via Teziutlán, Puebla, Mex., and Ejutla, Oaxaca, Mex. Employs 2,500 men. Robt. S. Towne, pres. and treas.; Stephen W. Reynolds, vice-pres.; Chas. J. Peabody, second vice-pres.; preceding officers, A. Foster Higgins, W. J. Best, E. W. Gould, Jr., Henry L. Nelson, Henry Shepard and R. M. Carter, directors; Donald C. Brown, asst. gen. mgr.; T. Skewes Saunders, mine supt.; Frank Cazin, chief engr.; R. L. Lloyd, smelter supt.

Organized April, 1905, under laws of New Jersey, capitalization \$10,-

Traveler's Edition, North American mines only—thin paper, flexible leather cover—for machinery salesmen and mining engineers.

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000,000, shares \$100 par. Controls, through entire stock ownership, the Teziutlán Copper Co., and has a close working agreement with the Compañía Minera Mexicana. Regular dividend rate is 6% per annum, and dividends were \$100,000 in 1903; \$350,000 in 1904; \$495,216 in 1905; \$800,000 in 1906; \$800,000 in 1907; \$300,000 in 1908; none in 1909-10; \$400,000 in 1911, and \$400,000 in 1912. State Street Trust Co., Boston, transfer agent. Annual meeting, first Thursday in June.

Owms La Aurora and the Ocote mines, the former with 4,500 acres, 10 miles from Teziutlán, and about 130 miles E. of the City of Mexico, with a 16-acre smelter site, and 2,500 acres of miscellaneous lands, including La Chignautla limestone quarry, about 3 miles from the smelter. The climate is equable, and the mines are surrounded by fine arable lands, with an adequate supply of good labor.

La Aurora mine, opened mainly by tunnels, has developed a considerable body of chalcopryite ore containing sphalerite, giving average assays of about 8% copper, up to 200 grams silver and 5 grams gold per metric ton, with 15% iron, 20% sulphur, 10% calcium carbonate and 30% silica.

Los Ocotes group, 240 hectares, bought Oct., 1905, is 2½ miles N. of San Martín, Ejutla, Oaxaca, Mex., and includes the San Juan mine, which is one of the few copper properties that has paid for development, from production, since inception, and in addition, has given a profit, the mine having been a steady producer since 1900. This property shows 4 fissure veins, in porphyry. The one worked in the San Juan mine varies from 2 to 30' in width and has lenticular shoots of quartzose-chalcopryite ore without zinc, antimony, arsenic or bismuth. The ore averages 4 to 5% copper, and 15 oz. silver per metric ton, with a trace of gold, and the mine has produced considerable ore carrying up to 11% copper and 4 kgs. silver per metric ton. Development is by 4 shafts, 1 for ventilation. The San Juan or main shaft is 830' deep, and is connected on the 7th level with the Dolores shaft, 200 meters to the N. of 164 meters depth, having 9 levels. The San Francisco shaft, 475 meters S. of the San Juan, is not yet connected with the main workings. The mine is quite dry, making only about 25,000 gals. of water daily. Ore reserves were estimated March, 1912, at 1,000,000 tons. Property was closed down 1912, owing to disturbed conditions in Mexico.

Equipment at the San Juan mine of Los Ocotes group includes steam, gas and electric power, with steam hoists good for 500 meters depth, at the San Juan and Dolores shafts, and a 6-drill Rand air compressor. There also is an old mill erected by the former owners near the San Juan shaft. The production of Los Ocotes group was 290 tons of concentrates, yielding 121,000 lbs. fine copper and 16,700 oz. silver, in 1904, under the old management, since greatly increased.

The company owns a private narrow-gauge railway, of 10.7 miles length, from La Aurora mine to Teziutlán, where connection is had with the Inter-oceanic Railway of Mexico. This line, formerly operated electrically, now has 2 Shay mountain-climbing locomotives, with a Rogers switch engine at the works. A railway is projected from Teziutlán to the port of Nautla, on the Gulf of Mexico, a distance of 100 miles, which would give a direct outlet, and reduce transportation charges, which are very high at present.

The company has 2 aerial tram lines, the lower of 50 metric tons hourly capacity, carrying ore and limestone, and the upper, of 15 metric tons hourly capacity, with automatic loading and dumping devices, carrying limestone only.

A new 500-ton concentrating mill was under construction, 1913, at Aire Libre, Puebla, Mex., and was expected to start work in December.

The old smelter, near La Aurora mine, has 3 blast furnaces, and is of

about 300 tons daily capacity. The new smelter, 17 kilometers from Teziutlán, is thoroughly modern in design and equipment, having been remodeled and blown in April 8, 1910. Buildings are all of concrete and steel and the flow of material is by gravity throughout. Ore is brought from the mine in trains of 4 cars each, passing over a gravity tramway equipped with scales and dumped in two rows of six 250-ton ore and flux bins, built of 3/16" steel, having pneumatic gates. There are two 500-ton blast furnaces, each 48x240" at the tuyeres, doing semi-pyritic smelting, requiring about 7½% charges of Connellsville coke, charged by cars taking current from a third rail, with motors mounted on the axles, ore being dumped into 65-ton charge hoppers above each furnace. Each hopper is divided into 6 vertical sections, for half the height, each section having 2 gates, operated hydraulically by banks of levers in front of the furnace, permitting charging to any part of each furnace desired, as charging can be done at 10 different points independently. The discharge of the water-jacket piping is visible. The furnaces have 11' circular settlers, of 4' 6" height, with 18' linings, provided with cooling pipes. Under the furnace floor is a 4x7' concrete-lined s'ag tunnel, which also cares for drainage, slags being granulated and washed out by a jet of water into the river, the launder having a 45' fall. A 10' steel balloon flue leads from the furnaces to the 150' steel stack, of 14' diameter, set on a 30' concrete base.

The converter department, occupying an extension of the furnace building, has a 30-ton electric crane, of 40' span. There are 2 stands and six 84x126" shells, with fusible disks, tilted electrically. Blister copper is cast into 110-kg. pigs, in tilting moulds carried on trucks, and converter bars, averaging 98.6% in copper tenor, are exported through Vera Cruz for refining at the Perth Amboy works, and electrolytic copper is marketed by L. Vogelstein & Co.

The power plant at the smelter has 5 Connorsville blowers of 10,000 cu. ft. capacity each, driven by 100-h. p. individual motors, for furnace blast, and a 40x42" Nordberg double blower, rope-driven by a 350-h. p. motor, for converter blast. There are 2 hydro-electric power plants and the cost of electric power is figured at only \$14 per h. p. year, exclusive of interest and insurance. The 1,000-h. p. hydro-electric installation at the smelter takes water from the Totoyic or Xolat river, through a 3,600' flume, under a head of 150', the company having a government concession for 2,500 liters of water per second from that stream. The second hydro-electric power plant, on the Atexcaco river, 9 kilometers from the smelter, has about 3,000 h. p. available, partially developed by a 1,500-kw. hydro-electric plant of 4 units, driven by Pelton wheels under a head of 1,340', delivering current at 6,000 volts, which is carried by double transmission lines, each of capacity adequate for the entire load, and stepped down to 440 volts in a transformer station at the smelter.

Production was 6,788,404 lbs. fine copper in 1902; 6,786,488 lbs. in 1903; 7,512,252 lbs. copper, 286,012 oz. silver and 3,057 oz. gold in 1905. The smelter was closed down Nov. 23, 1907, with development work continued in the mines, and the new smelter was completed and blown in late 1908, but was remodeled and again blown in April 8, 1910. The new plant has a capacity of about 12,000,000 lbs. fine copper yearly, and was producing, early 1911, at the rate of nearly or quite 1,000,000 lbs. fine copper monthly. The Teziutlán is the most promising and successful copper mine in southern Mexico, and the management is considered good.

THARSIS-YORK CO.

MEXICO

Office: 178 Devonshire St., Boston, Mass. Mine office: Nacozari, Sonora, Mex. Herbert E. Young, vice-pres.; Thomas L. Pryor, sec.; Wil-

lard T. Carleton, treas.; preceding officers, R. C. Heath, E. C. Williams, W. R. Sparrell, C. N. Lindley, Morton Lindley and Wm. J. Maloney, directors; M. Lindley, gen. mgr.; James Nolan, supt. Organized April 29, 1909, under laws of Delaware, capitalization \$1,000,000, shares \$5 par, fully paid and nonassessable; issued 145,761. Boston Safe Deposit & Trust Co., registrar; State Street Trust Co., transfer agent, Boston, Mass. Annual meeting, second Wednesday in April.

Lands, 12 claims, 1,015 acres, in 6 groups, 1 known as the Esquina, the main group, adjoining and lying between the Nacozari Consolidated Copper Co. and the Pilares mine of the Moctezuma Copper Co., with 1 shaft near the boundary of the latter. There are several attractive orebodies on the property, 3 partly developed.

The Esquina claims carry a dike-like mass of red-stained mineralized porphyry, similar to the outcrop of the Pilares orebody and on the same line of fracturing. This outcrop is 600' wide and extends across the claims. Like the Pilares it has a footwall of white rhyolitic breccia, a hanging wall of andesitic breccia and the lode filling is an altered, sericitized, silicified and mineralized rhyolite, supposedly with copper and iron sulphides below water level.

Development includes considerable prospect work, with shafts of 168' and 170', latter planned to be sunk to 300' with tunnels of 330', 107', 268' and 485', the mine having about 1,500' of workings March, 1913. At present the company is driving a crosscut tunnel (485' in April, 1913) to cut the lode at 800' in and to drain the bottom of the 168' shaft and continue across the ore zone. This mineralized belt has thus far shown only bunches of ore, but is expected to develop ore similar to that of the Pilares mine.

Equipment includes an 80-h. p. electric plant, with a 25-h. p. hoist and a 3-drill air compressor, and the company has the use of the shops of the Moctezuma Copper Co. The management plans continuous development doing 1,000 to 2,000' of drifting, 1913. Property considered promising and development well planned.

THIRD VENTURE MINING CO.

COLORADO

J. B. Stewart, mgr., Leadville, Lake Co., Colo. J. A. MacLennan, supt. Company owns a lease on the St. Louis mine which has a vein with complex sulphide ores carrying copper-lead and zinc with gold-silver values. Development is by 1,450' tunnel. Equipment is electric with Leyner air compressor.

THOMPSON FALLS COPPER MINING & MILLING CO. MONTANA

Company owns the Copper King mine at Thompson, Sanders Co., Mont., which was operated by leasers about 1911, and E. D. Farmin was general manager, at last accounts. Mine has an 8' vein showing low-grade concentrating ore with streaks of shipping ore. This is an old mine equipped with a concentrating mill, but idle for many years prior to 1909, when it was reopened, worked for a few years and again became inactive.

THOMPSON-QUINCY CONSOLIDATED MINING CO.

UTAH

Office: 603 Judge Bldg., Salt Lake City, Utah. Mine in the Park City district, Summit Co., Utah. Frank J. Hagenbarth, pres.; Arthur L. Thomas, Jr., sec.; W. S. McCornick, treas. Organized Dec. 24, 1910, under laws of Utah, capitalization \$1,250,000, shares \$1 par, as a merger of the J. I. C. Mining Co. and the Quincy-Thompson Consolidated Mining Co., the latter company being itself a merger of the West Quincy and Thompson Mining companies. The West Quincy received 285,890 shares, the Thompson Co. 338,600 shares; 75,000 shares each were given the Ontario Silver Mining Co. and Daly Mining Co. and 50,000 to the Daly West for the use of their workings. The financial statement of the company for the year ending

Oct. 31, 1912, shows \$5,411 spent for mine supplies, \$11,562 for mine labor and \$1,958 for general expenses, all met by the sale of 5,000 shares treasury stock and a 6% loan. Total debt of company, \$26,552.

Property, 134 acres, of which 5 claims were furnished by the West Quincy and 64 acres by the Thompson. The property of the West Quincy Mining Co. was a three-eighths interest, with an option on the outstanding five-eighths interest, in the property of the J. I. C. Mining Co. The claims supposedly carry the extension of the Quincy orebody of the Daly West mine and are developed by a 625' two-compartment vertical shaft and a crosscut tunnel through the Little Bell mine, cutting a contact vein carrying ore assaying up to 20% lead, 160 oz. silver and \$2 gold per ton. The mine is to be developed through the Ontario drain tunnel No. 2, which was extended to the Quincy-Thompson mine by the Ontario company.

The company has found rich silver-lead ore and started production with a 50-ton shipment of high-grade ore in July, 1913. In September it was reported to have 2½ of smelting ore in several faces. Present work is mainly from the 900' level of the Daly and Ontario companies and a shaft raised from the 900' Daly West level to the contact was completed, 1913. Company's present copper production is negligible.

THOR MINING CO.

UTAH

Office: 412 Judge Bldg., Salt Lake City, Utah. Mine office: Brighton, Salt Lake Co., Utah. W. L. Snyder, pres.; Peter Kane, vice-pres.; Blaine Bowman, sec.-treas.; Peter Cass, supt. Organized Sept., 1909, under laws of Utah, capitalization \$100,000, shares 10 cts. par. Property, 22 claims, unpatented, in the Bonanza Flat section. The group is at the head of Big Cottonwood canyon adjoining the Daly Judge on the S. W., and is opened by the Snake Creek tunnel. The veins carry argentiferous and slightly auriferous lead and copper ores. Equipment includes a small steam plant, with an air compressor.

THREE B. MINING CO.

COLORADO

C. E. Himan, superintendent, Lake George, Park Co., Colo. Property has vein of copper ore carrying gold-silver values. Developed by 150' shaft. Equipment includes steam power, compressor, etc.

THREE CRIPPLES MINING CO.

WYOMING

Office and mine: Esterbrook, Albany Co., Wyo. H. C. Saul, sec.; G. W. Johnson, vice-pres. Lands, lying immediately N. of the holdings of the Maggie Murphy Copper Co., have an 85' shaft, showing copper ore with values mainly in gold. Equipment includes a small steam plant. Company reports 1913, that annual assessment work is kept up, but no development attempted.

THREE FORKS COPPER MINING CO.

MONTANA

Mine office: Three Forks, Gallatin Co., Mont. Herbert G. Dunbar, superintendent, at last accounts. The mine has a 300' shaft, developing somewhat bismuthiferous ore assaying up to 20% copper, with small gold and silver values. Equipment includes steam power and an air compressor. No returns secured.

THREE FRIENDS MINE.

ALASKA

Owned by Three Man Mining Co.

THREE MAN MINING CO.

ALASKA

Office: 31 Nassau St., New York. Mine office: Landlock, Prince William sound, Alaska. W. A. Dickey, pres. and gen. mgr.; H. C. Bryan, sec.; Duncan Edward, treas.; preceding officers, directors. C. W. Harrington, supt., and H. H. Dickey, purch. agt. Organized under laws of New York, capitalization \$1,000, shares \$100 par, fully issued. Is a close corporation having only 3 shareholders.

Lands, 43 claims, 10 patented, 812 acres, on tidewater, at Landlock bay, in the Valdez mining district of Alaska. The property, which has been under continuous development since 1903, shows 10 orebodies having a general E-W. strike, occurring as fissure veins and as deposits in shear zones in greenstone and slates and averaging 8' in width, carrying chalcopryite ore in lenticular shoots which average 10% copper. Low-grade ore is continuous, with rich ore found mainly on the footwall in paystreaks of 1 to 8' width, the largest shoot carrying massive chalcopryite assaying 10% copper, 1 oz. silver and 50 cts. gold per ton. The quantity of low-grade ore of concentrating tenor is very much greater than that of the smelting ore, but the concentrating ore is not available for present use.

The mine is developed by 5 tunnels, 100 to 1,000' long, Nos. 1 and 2 being connected by a 65' raise, all in ore, and the mine, having upwards of 5,200' of workings, was estimated by the management to have about 20,000 tons of ore in sight, April, 1913. A test shipment of 150 tons gave returns of about 12.5% copper. No stoping has been done, all ore produced having been extracted from levels and upraises.

The mine has no machinery or power equipment, owing to development by tunnel, but has 14 buildings, with ore bunkers on a wharf at tidewater, connected by a short ground tram with the portal of the 5th level. Production was about 600 tons of 10% ore 1910, shipped to the Tacoma smelter, yielding 120,000 lbs. fine copper and over 3,000 tons of 10% ore yielding 610,000 lbs. fine copper in 1912. The company has a bond and lease on the Mason & Gleason property at Irish cove, and did development work on the claims in 1912. Property considered promising.

THREE R MINES.

ARIZONA

Mine office: Patagonia, Santa Cruz Co., Ariz. R. R. Richardson and A. E. Crepin, owners. Property operated under option since April, 1912, by N. L. Amster, 67 Milk St., Boston, Mass. John D. Wanvig, superintendent.

Lands, 55 claims, about 1,000 acres, unpatented, on the westerly slope of the Patagonia mountains, 9 miles S. of Patagonia, at an elevation of 5,000'. Claims show alaskite with small, irregular areas of trachyte and rhyolite porphyries. Ore occurs mainly along several lodes in a N-S shear zone as chalcocite in high-grade shoots and also disseminated low-grade values. The first orebody opened had stopes 70 to 80' long and 40' wide extending from the 50' to the 400' level, a second parallel ore shoot, 100' from the first, was 23' wide and carried 8% ore.

Development consists of the 346' Colossus tunnel, Evening Star tunnel of 843' and the 260' Colossus shaft, with total underground workings of 8,740', of which 6,635' is at the Colossus mine. Reserves, Sept., 1913, are reported as 50,000 tons of 3 to 4% ore. Practically all the high-grade ore has been mined.

Equipment includes a 50-h. p. Fairbanks-Morse oil-type hoist at the Colossus shaft, 40-h. p. and 60-h. p. oil-type engines operating individual belt-driven Sullivan air compressors. Company employs about 25 men.

Mine produced from April to Sept., 1913, 3,717,571 lbs. fine copper from 22,253 tons dry ore, averaging 9.1% copper. In Oct., 1913, high-grade ore was reported to have been found on the 800' level.

THUMB BUTTE MINING CO.

ARIZONA

Probably idle. Office: Yuma, Ariz. Mine near Dome, Yuma Co., Ariz. J. Porter Moffitt, pres.; G. Livingstone, vice-pres.; J. L. Lee, second vice-pres.; H. E. Penny, third vice-pres.; A. B. Ming, sec.-treas., and A. H. Keat, directors; Chas. Theobald, supt. Organized July, 1907, capitalization \$1,500,000.

Lands, 24 claims, 480 acres, 20 miles from a railway, opened by a 330' main shaft, with bottom level at 300', show a vein of 14' estimated width, carrying argentiferous and auriferous copper ore, including some chalcocite, estimated to average \$32 per ton in gross values. Equipment includes a 12-h. p. gas engine. No returns secured.

THUMB BUTTE MINING & MILLING CO.

ARIZONA

Mine office: Prescott, Yavapai Co., Ariz. Lands, 4 claims, 240 acres, 4 to 8 miles W. of Prescott. The property, having a fair surface showing, is developed by several short tunnels, showing copper ore of low average grade. Annual assessment work being done.

THUNDER CREEK MINING CO.

WASHINGTON

Succeeded by Thunder Creek Transportation & Smelting Co., reorganized as Puget Sound, Chelan & Spokane Railway Co., 1912.

THUNDER CREEK TRANSP. & SM. CO.

WASHINGTON

Office: Marblemount, Skagit Co., Wash. Is probably a reorganization of the Thunder Creek Mining Co., whose property on the creek of that name, in Cascade district, eastern Skagit county, was sold in 1912 to the Skagit, Cascade & Chelan Railway Co., which later changed its title to the Puget Sound, Chelan & Spokane Railway Co.

Claims show veins of complex sulphide ore holding lead and zinc and copper. Development includes several short tunnels only.

TIA JUANA MINE.

ARIZONA

Owned by Balcolm, Kane and the estate of Prof. W. P. Blake. Mine is on the S. slope of the Santa Rita mountains, in Santa Cruz county, Ariz., at 7,000' elevation. Is said to show wide veins carrying copper and silver ores. Examined in the spring of 1913 for English copper interests.

TICON MINE.

MONTANA

Wm. O. Glymo, superintendent. Property is owned by Jas. A. Murray and the estate of Silas F. King, of Butte, Mont. Lands are 1 fractional claim, about 2 acres, lying between the Bell and Wild Bill mines of the Anaconda and the Speculator and Edith May claims of the North Butte. Mine has a 600' incline shaft on the vein with levels opened at 300', 500', 550' and 600', said to show 4' of good ore in the bottom. Work was stopped by an injunction, secured by the Anaconda Copper Mining Co. in 1908.

TIEWAUKEE LEASING CO.

UTAH

Is controlled, through stock ownership, by Scott Mines Co. Company has, or did have, a lease of the Tiewaukee mine, now owned by the Montana Bingham Consolidated Mining Co. No trace of operations secured.

TIGER GOLD CO.

ARIZONA

Office: 184 La Salle St., Chicago. Mine office: Harrington, Yavapai Co., Ariz. Andrew G. Scherer, mgr.; Stanton W. Forsman, supt., at last accounts. Property is the Grey Eagle and Oro Bella mines, carrying veins with auriferous and argentiferous copper ore, developed by 8 tunnels and a 400' shaft. Property is primarily a gold mine with smaller values in silver and copper. Equipment includes steam and water power, an air compressor, a 20-stamp mill and a 60-ton concentrator, employing about 35 men at last accounts. Production was 19,010 lbs. fine copper, 9,937 oz. silver and 4,313 oz. gold in 1907; 3,639 oz. silver and 1,823 oz. gold in 1908; 4,802 lbs. fine copper, 2,725 oz. silver and 1,226 oz. gold in 1909. Company has operated mine continuously 1912-13, but the production has not been reported to this office.

TILLICUM DEVELOPMENT CO.

WASHINGTON

Office: Holyoke, Mass. Mine at Loomis, Okanogan Co., Wash. A. G. Elston, pres.; L. M. Deller, sec., both of Spokane, Wash.; F. G. Burnham, treas., Holyoke, Mass.; E. C. Limbach, gen. supt. Is the successor of the

Palmer Mountain Tunnel Co., organized Aug. 1912, under laws of Washington, capitalization \$300,000, shares \$1 par, 50,000 preferred, 250,000 ordinary; issued 30,000. Debentures, \$19,000, 6%, none issued.

Property, 15 claims, 250 acres, in the Loomis (Palmer Mt. or Wannacut Lake) district, 12 miles from the Great Northern railroad. The Summit claim shows a N.W.-S.E. fissure vein in diorite, averaging 8' wide and proven to depth of 115'.

Development comprises 3 tunnels, all on the vein, the 2 uppermost 35' apart vertically, connected by raises, besides a 50' winze from the middle tunnel. The lower tunnel is 157' long and must be extended 250' to reach this winze. These workings are all on the vein and all show ore of commercial grade, but in small amounts. Vein averages 5' between walls and gives indications of opening up an orebody of profitable size. Ore reported to average \$40 gold and 10 oz. silver with traces of copper. Company has 750-h. p. water power and 450-kw. electric plant, transmission line and machinery, as well as 100-stamp mill and sawmill.

The reorganization was effected by purchase of property at receiver's sale for \$26,000, \$19,073 cash and balance in old company's overdue notes. Old noteholders receive 27,958 shares preferred new stock at par with an equal amount of common stock as bonus for their notes and all stockholders of the Palmer Mountain Tunnel Co. are offered stock on the same terms. Company's original plan of tunneling Palmer Mountain is temporarily abandoned. This crosscut is reported to be 5,993' long.

TILT COVE COPPER CO., LTD.

NEWFOUNDLAND

Office: 9 Queen Street Place, London, E. C., Eng. Mine office: Tilt Cove, Newfoundland. John Taylor, chairman; E. C. Leaver, sec.; preceding officers and A. E. Berthoud, directors; John Taylor & Sons, mgrs.; F. J. Williams, supt. Organized April 4, 1888, under laws of Great Britain, capitalization £200,000, shares £2 par; issued £178,000, fully paid. Debentures, £80,000, at 5½%. The property has been under lease for 99 years, expiring 1989, to the Cape Copper Co., Ltd., but terminated by notice from the lessees, Aug. 31, 1913. The annual rental was £4,400, plus one-half of the net profits. Profits were £99,340 in 1906; £57,534 in 1907; £9,107 in 1908; £5,714 in 1909; £7,050 in 1910; £15,072 in 1911, and £13,293 in 1912, half of which goes to the Cape Copper Co. After payment of London expenses, profit was £5,380. Reserve fund, 1912, £10,000 cash; debentures holders objected to this being distributed to stockholders. The company has a reserve fund of £10,000, invested in British consols. Dividends were 11¼% in 1901; nothing in 1902; 5⅜% in 1903; 7½% in 1904; 13¾% in 1905; 26¼% in 1906; 12½% in 1907; 4⅜% in 1908; 3⅜% in 1909; none in 1910; 3⅜% in 1911, and 3½% in 1912.

The ore is pyritic with 3 to 4% copper and is shipped to Britonferry, South Wales, where its sulphur is used in acid and fertilizer manufacture and the residue smelted for copper.

Lands, freehold, are on Notre Dame bay, 7 miles W. of Cape John, on the northern shore of Newfoundland. The property includes the East, Bluff and South mines, which have been worked since 1870. The East mine shows some nickel ore, and its copper ore is of somewhat higher average grade than the other properties. The East and South mines have an ore zone of about 250' width, with a diorite hanging wall, associated with ferruginous slate, and a prominent gossan caps lenses of chalcopyrite and pyrite ore of 4 to 36' width, the largest one 150' long, but thinning out on all sides. The East and South mines yield ore averaging 3 to 3.5% copper, with \$1 to \$2 silver and gold per ton. The pyritic ore from the East mine averaged about 3.7% copper in 1896. Ore reserves in all mines, estimated 1911, at

only 20,000 tons, and former annual production of 75,000 to 100,000 long tons, has shrunk to about 37,000 tons. Ore mined cost \$1.86 in 1910. The monthly output in the summer of 1912 averaged 692 tons of 3.25% ore from the East mine, 565 tons of 3.75% ore from the South lode and 133 tons of 7.28% ore from the West Bluff mine.

Production has been as follows: 1904, 6,122,000 lbs.; 1905, 5,104,960 lbs.; 1906, 5,136,320 lbs.; 1907, 3,875,200 lbs.; 1908, 3,203,200 lbs.; 1909, 3,095,680 lbs.; 1910, 2,419,200 lbs.; 1911, 1,435,000 lbs.

The output for 1912 is not reported but is said to have given a profit at the mine of £15,561, or a net profit of £13,293.

TINTIC CENTRAL MINING & MILLING CO.

UTAH

Office: Provo, Utah. Mine address: A. N. Haldaway, Knightsville, Juab Co., Utah. Geo. M. Smoot, pres.; R. L. Anderberg, sec.-treas. Organized June, 1907, under laws of Utah, capitalization \$50,000, shares 5 cts. par, assessable; all issued. Three assessments yearly of one-half cent a share. Cash on hand; Jan. 1, 1913, \$498.

Property, 20 claims, covering ground adjacent to the Iron Blossom in the Tintic district and supposedly carrying the extension of the ore bearing fissures of that mine. These fissures are in limestone and are cut by porphyry, carrying irregular but very profitable orebodies.

Development includes a 1,038' shaft with extensive workings on the 870', 920' and 1,020' levels. During 1912, work was confined to the 920' level running main drift 990' N. E., but finding only copper-silver ore with 1.1% copper and 5.5 oz. silver, on which a raise was driven.

TINTIC COMBINATION MINING CO.

UTAH

Office: 425 Atlas Block, Salt Lake City, Utah. Mine office: Eureka, Juab Co., Utah. W. H. King, pres.; B. H. Bullock, vice-pres. and mgr.; H. J. Fitzgerald, sec.-treas.; preceding officials, I. A. Smoot and T. H. Fitzgerald, directors; Elmer Duncan, supt. Organized June 20, 1908, under laws of Utah, capitalization \$1,000,000, shares \$1 par, assessable. Shares are listed on the Salt Lake Stock Exchange. Lands, 10 claims, opened by a 220' two-compartment shaft, developing auriferous and argentiferous lead and copper ores. Is reported by state official as a copper producer, in 1912. Equipment includes a small hoist.

TINTIC CO.

UTAH

Office: 747 Fifth Ave., New York. Mine office: Bingham Canyon, Salt Lake Co., Utah. Grant B. Schley, pres.; Kenneth B. Schley, vice-pres. and sec.; E. B. Schley, treas.; preceding officers, Frederick Strauss, Alfred Jaretzki, E. J. Berwind and D. Sullivan, directors. Organized 1903 under laws of Maine, capitalization \$2,700,000, shares \$3 par; issued \$2,091,249. Original capitalization, \$3,000,000, shares \$5 par, increased, 1906, to \$4,000,000, with an outstanding issue of \$3,500,000 stock in 700,000 shares of \$5 par, which was first reduced 1909, to \$2,100,000, by cutting the par value from \$5 to \$3 and was immediately thereafter increased to present amount of \$2,700,000. Bonds, \$500,000 authorized, at 6%, convertible into stock, of which \$422,900 is outstanding, this bond issue having been made to liquidate a floating debt. The company is a securities-holding corporation only, and is the parent company of the Tintic Mining & Development Co., Yampa Smelting Co. and West Mountain Tramway Co., properties of which are described under the titles of the 2 first-named companies.

TINTIC DELMAR MINING CO.

UTAH

Office: Snow Bldg., Provo, Utah. Mine office: Eureka, Juab Co., Utah. Andrew Madsen, pres.; Wilford Giles, vice-pres.; Harvey Cluff, sec.-treas. Organized March 27, 1909, under laws of Utah, capitalization \$100,000, shares 10 cts. par. Lands, 27 claims, partly patented, in the North Tintic district,

having a 400' tunnel with a depth of 170', showing stringers of quartz carrying ore giving good assay values in silver, lead and copper where 2 large cross breaks intersect. In Aug., 1913, a 100' winze encountered fissures opened by drift at bottom, showing ore carrying 358 oz. silver, \$3.09 gold, 2.65% lead and a little copper in a shoot encased in low-grade ore.

TINTIC MAYFLOWER MINING CO.**UTAH**

Idle. Office: Snow Bldg., Provo, Utah. Mine office: Eureka, Juab Co., Utah. W. D. Rawson, pres.; Andrew Madsen, vice-pres.; J. C. Anderson, sec.-treas.; preceding officers, Hyrum Madsen and Rufus Babcock, directors. Organized July, 1909, under laws of Utah, capitalization \$100,000, shares 10 cts. par. Property, in the northern part of the Tintic district, near the Tintic Delmar Mining Co., is under the same general management.

TINTIC MINING & DEVELOPMENT CO.**UTAH**

Office: 747 Fifth Ave., New York. Mine office: Bingham Canyon, Salt Lake Co., Utah. Grant B. Schley, pres.; D. Sullivan, vice-pres.; W. J. Walworth, sec.-treas.; E. B. Schley, asst. sec.-treas.; preceding officers, W. S. Gurnee, E. J. Berwind and Kenneth B. Schley, directors; D. F. Sheehan, supt. Organized Aug., 1896, under laws of West Virginia, capitalization \$3,000,000, shares \$5 par, and reorganized Jan., 1906, under laws of Maine, capitalization \$600,000, shares \$1 par. Is a subsidiary of the Tintic Co., and operated as a close corporation, making no public reports. Property was mortgaged 1910, for \$150,000, jointly with the Yampa Smelting Co. and West Mountain Tramway Co., to secure a \$675,000 issue of 8% gold bonds.

Lands include claims near the Mammoth, Grand Central and Centennial-Eureka mines in the Tintic district, having a 300' shaft, with a power plant and air compressor. Heavy expenditures on this property gave in different results, and it has been idle several years.

Owens the Yampa mine and a group of 30 claims, 180 acres, on Carr fork, Bingham canyon, near the Ohio mine, and adjoining the Utah Consolidated on the N. and Boston Consolidated on the W. The claims carry a contact or bedded vein, of 10' minimum, 37' average and 200' maximum width, between a quartzite foot and limestone hanging, this being among the largest orebodies in the Bingham district, outside of the properties having disseminated porphyry ores. The deposit carries disseminated chalcocite, covellite and chalcopyrite, said to average 1 to 3% copper, 2 oz. silver and \$1.50 gold per ton, while smelter returns for 1909 were only about 1.7% copper, and probably under \$2 per ton in combined gold and silver values. The ore has a considerable excess of iron, rendering it valuable for smelting the highly silicious ores common to the Bingham district.

Development is confined to the Yampa mine, a claim of less than 6 acres, entirely surrounded by the Utah Consolidated, and developed by 2 tunnels and a shaft. The Craig haulage tunnel, on the 1,200' level, is 3,248' long, intersecting the main vein at about 2,200' from the portal and connecting with the shaft at 2,448'. The upper or Yampa tunnel intersects the shaft at 475' and runs about 1,000' on the vein. The 1,700' shaft has 3 compartments, and is operated in 2 sections, 1 from the 400' level to surface, and 1 from that level to the 1,200' level, with balanced hoists. There are 12 levels opened, approximately 128' apart. Ore from the upper workings is sent down the shaft to the Craig tunnel, which has an electric haulage system, with 2 electric locomotives, taking trains of six 3-ton cars.

Equipment includes an electric hoist, installed 1912, and a power plant near the portal of the Craig tunnel, with steam and electric motors. Power

is furnished by the Telluride Power Co. There is a 35-drill Ingersoll-Rand 2-stage air compressor, direct-connected to a 200-h. p. motor. Ore is transported by the West Mountain Tramway Co., controlled also by the Tintic Co., which has a 12,270' Leschen aerial tram, the longest in the district, of 700 tons daily rated capacity, having 600-ton ore bins at the upper terminal, connecting with the Yampa smelter at the lower end. The tram line saves about 25 cents per ton on cost of transporting ore.

Production was 4,069,886 lbs. fine copper, in 1905; 4,699,765 lbs. in 1906; 5,001,255 lbs. in 1907; 5,412,850 lbs. in 1908; 6,500,000 lbs. in 1909, 6,172,243 lbs. in 1910, and 6,157,175 lbs. in 1911. Production, formerly sent to the Yampa Smelting Co., is now shipped to Garfield. The Yampa mine, though small, is considered valuable and the management good.

TINTIC SILVER CROWN MINING CO.

UTAH

Letters unclaimed at Salt Lake City and Mammoth, Utah. Hon. John A. Edwards, pres.; Dr. L. W. Snow, vice-pres.; Mansfield L. Snow, sec-treas. and gen. mgr.; preceding officers, C. E. Cole and M. K. Green, directors. Organized Aug. 20, 1908, under laws of Utah, capitalization \$1,000,000, shares \$1 par, nonassessable; fully issued.

Lands, 25 claims, 500 acres, in the Blue Belle district of the West Tintic, 8 miles from a railway. The property shows fissure veins in porphyritic rocks and contact deposits in crush zones in quartzite, carrying outcrops of ore giving good assay values. There are 10 orebodies, of which 3 are developed by three 50' shafts and 5 tunnels of 40 to 250', the mine having about a quarter mile of workings. One vein shows a 10" paystreak of massive galena, estimated at 70% lead, 12 oz. silver and 75 cts. gold per ton. Equipment includes a small steam plant and an air compressor. Presumably idle.

TINTIC SMELTING CO.

UTAH

Office: Provo, Utah. Works office: Silver City, Juab Co., Utah. Chas. W. Nibley, pres.; Jesse Knight, vice-pres. and gen. mgr.; H. E. Rolapp, sec.; John Pingree, treas.; Bela Kadish, supt.; preceding officers, David Eccles and Col. C. Edw. Loose, directors. Organized Dec., 1906, capitalization \$500,000, shares \$1 par.

Property is the Knight smelter, or reduction plant, built 1907-08, of about 350 tons daily capacity. The works include a sampling mill, two 14x60' hand roasters, 4 Kelly sintering converters and three 46x162" lead furnaces. A 125-ton blast furnace for copper is in a separate building. The plant was blown in, 1908, and closed down Sept., 1909, after making an operating loss said to have been \$211,000 in 1 year, with a total loss, including the cost of the plant, of nearly \$1,000,000. The plant is of modern design, well equipped and well located for receipt of lead ores, with considerable copper ore available, but was put out of business by its inability to secure coal and coke at the same freight rates as other Utah smelters, and by its failure to secure a sufficient variety of ores to permit satisfactory furnace mixtures. Property idle at last reports and the title held by the Knight Metallurgical Co.

TINTIC STANDARD MINING CO.

UTAH

Office: 422 Judge Bldg., Salt Lake City, Utah. Mine office: Eureka, Juab Co., Utah. E. J. Raddatz, pres., treas. and gen. mgr.; W. I. Snyder, vice-pres.; Geo. F. Busch, sec.; preceding officers, A. N. Holdaway and Jas. Beveridge, directors; John Westerdahl, supt. Organized Oct. 2, 1907, under laws of Utah, capitalization \$1,000,000, shares \$1 par, assessable; issued \$895,000. Annual meeting, Sept. 15 each year.

Lands, 11 claims, patented, 185 acres, 2½ miles from a railway, in the East Tintic district. The property shows limestone and porphyry, carrying

fissure veins with N.-S. strike and dip of 55° W., in limestone, with lead and copper ores, reported to assay from a trace to 50% lead, 1 to 105 oz. silver and \$1 to \$15 gold per ton. The management reports the main orebody as 200' wide. The mine has an old incline shaft and a 1,000' shaft, with nearly a mile of workings. The 1,000' level, 925' E., has a promising showing but though the company has done a large amount of work by shaft, drifts and diamond drill, it has failed to locate a profitable orebody, though some shipping ore was found, 1910.

Equipment includes a 100-h. p. steam plant, with an 80-h. p. double-cylinder hoist, good for 1,500' depth, and a 3-drill Rand air compressor. There are 5 buildings.

TINTIC VOLCANIC MINING CO.

UTAH

Idle. Office: 26 Walker Bank Bldg., Salt Lake City, Utah. Mine office: Eureka, Juab Co., Utah. R. A. Barney, pres.; Nicholas Comes, vice-pres.; E. H. McBeth, sec.-treas. Organized April 1, 1909, under laws of Utah, capitalization \$100,000, shares 10 cts. par, assessable; issued \$70,000. Lands, 5 claims, unpatented, adjoin the Tintic Standard on the E., developed by shallow shaft showing argentiferous and auriferous lead and copper ores.

TIP TOP COPPER CO.

ARIZONA

Idle. Office: Commonwealth Bldg., Philadelphia, Pa. Mine office: Helvetia, Pima Co., Ariz. Geo. A. Aman, pres.; S. Charles Pratt, vice-pres. and gen. mgr.; Jos. Chamrod, supt., at last accounts. Organized 1902, under laws of Arizona, capitalization \$1,150,000, shares \$1 par.

Lands, 24 claims, 400 acres, also known as the Little Helvetia mine, including the Tip Top and Copper Duke claims, also a 100-acre mill site, about 2 miles from Helvetia, show 3 veins, averaging 14' width. These veins have extensive bodies of soft black sulphide ore in altered clayey limestone and porphyry. This ore is reported to give average assays of 5% copper and 1 oz. silver per ton, with a trace of gold.

Development is mainly by tunnel with portal near the wagon road. The workings and stopes are extensive (4,000), but not deep. There are also the usual prospect shafts and tunnels. Equipment includes gasoline power. Was bonded 1907, to Guggenheim interests, for \$250,000, with cash payment of \$75,000, but both parties to bargain were dissatisfied, and property reverted to owners. Made considerable ore shipments, 1906-07.

TIP TOP MINE.

ONTARIO

Col. O. S. Ray, owner, Port Arthur, Ont. Mine near Kashaboiwe, Rainy River district, Ont. Lands, 4 claims, freehold, 336 acres, being locations K62, K63, K64 and K65, 9 miles by trail S. W. of Kashaboiwe station, Canadian Northern railway. The claims are near Round lake, in Moss township. They show schist, greenstone and quartz porphyry of Keewatin age, with folded quartzite cut by quartz porphyry dikes. The ore occurs disseminated in dikes of flesh-colored felsite and quartz porphyry. There are several lenses of this chalcopryite and pyrite ore, stoped for 8 to 10' wide and 40' long, giving average assays of 7% copper, 5 to 12 oz. silver and \$1 to \$2 gold per ton.

Development is by a main incline shaft, dipping 70° N., of 208' depth, with about 700' of workings, on 4 levels, with 100 to 120' of drifting on each level. This work is estimated to show 45,000 tons of ore, of 4 to 6% copper, on a vein ranging up to 60' width in the bottom workings.

Equipment includes a 100-h. p. steam plant, with 30-h. p. hoists, and a 4-drill Ingersoll-Sergeant air compressor. Part of the material for a smelter was secured 1907, but the smelter was not built. See Ontario Bureau of Mines Report, 1911, p. 209.

TIRO GENERAL DE CHARCAS MINE.**MEXICO**

Mine address: Charcas, San Luis Potosi, Mex. Owned by Cia. Metalurgica Nacional de Matchuala, controlled by the American Smelting & Refining Co. Mine was formerly owned by the Cia. Minera del Tiro General, S. A.

Lands, 72 pertencias, 178 acres, with a 46-acre mill site, and a 50-acre farm, in the Venado district. The property, which is an antigua, discovered A. D. 1583, was worked on a small scale for 3 centuries, and in a larger way since 1859, shows 2 main ore zones, carrying fissure veins in porphyry, near a limestone contact, with a generally E.-W. strike and dip of about 70°. The N. vein, of 3 to 8 meters width, with known length of 500 meters, is opened to depth of 1,361', showing chalcopyrite and sphalerite estimated by the management to average 2% zinc, 430 grams silver and 8 grams gold per metric ton. There are 9 tunnels, 4 being reported by the management to be of 656' each, and 5 being reported to be of 1,312' each, the mine having 13,123' of workings. Feb. 18, 1911. The mine and works employ about 1,200 men.

Equipment includes a 700-h. p. steam plant, with hoists of 100-h. p. and 175-h. p. and a 10-drill air compressor, and some use is made of malacates, at the shallower shafts. Fuel is Mexican Rosita coal, costing 15.50 pesos per metric ton, with a yearly consumption of about 4,000 tons. Buildings include an engine house, combination smithy and carpenter shop, a well-equipped machine shop, general store, office, laboratory, warehouses, a hospital, 5 dwellings for officials, and accommodations for 40 Mexican families. There is a 10-stamp mill and a 150-ton concentrator, having 7x12" and 10x20" Blake crushers and 5 sets of rolls, with trommels and other necessary equipment. This mill has 10 Sutton, Steele & Steele pneumatic dry concentrators, treating all the sulphide ores and giving a preliminary lead concentrate, cut out from the final zinc concentrate, the latter being a 45% zinc product, secured largely from rosin jack.

The company has a private standard-gauge railway, known as the Central de Potosi, of 15.1 kilometers length, running to Charcas, where connection is had with the Mexican National line.

Production was 40,449 metric tons of ore, of 2.27% average copper tenor, in 1907, and 50,000 metric tons of ore, averaging 2.1% copper, in 1910; 1,929,036 lbs. fine copper in 1904; 2,281,761 lbs. in 1905; 1,620,000 lbs. in 1907; 2,100,000 lbs. in 1910. The property is considered valuable, and management good.

TIRO GENERAL; CIA. MINERA DEL.**MEXICO**

Sold property to the Cia. Metalurgica Nacional de Matchuala, San Luis Potosi, Mex., which is controlled by the American Smelting & Refining Co.

TOGO MINING & SMELTING CO.**WASHINGTON**

Office: 1023 Paulsen Bldg., Spokane, Wash. Mine at Springdale, Stevens Co., Wash. M. Isbister, pres.; Geo. C. Gates, vice-pres.; V. W. Brasch, sec. and gen. mgr.; Wm. H. Stowell, treas., all of Spokane; preceding officers, M. M. Ferguson and W. D. Valentine, directors. Organized 1905, in Washington, capitalization \$1,500,000, shares \$1 par, nonassessable since 1910. Annual meeting, June 30.

Property, about 240 acres, 160 patented, in Cedar Canyon district. Ore occurs principally as copper pyrites in slate, serpentines and quartzite with a N.-S. strike and 60 to 90° dip. One orebody, developed by tunnels, with about 2,000' of workings, is reported by management to average 3 to 5' in width, in upper levels, and to carry 8% copper, 3½ to 5 oz. silver and a trace to .02 oz. gold per ton. Upper levels said to show bornite, copper

glance and a little native copper. A 1,000' crosscut tunnel is said to cut several veins, undeveloped at last reports.

Equipment includes gasoline engine and hoist, but mine buildings were destroyed by a forest fire and mine has been closed down since 1910. Management plans erecting new buildings this year, as well as installing power, compressor and drills.

TOLEDO MINING & POWER CO.

MONTANA

Mine near Sheridan, Madison Co., Mont. Louis D. McCall, president and general manager, at last accounts. Organized 1905, capitalization \$50,000, as successor of Bismarck-Nugget Gulch Consolidated Mining Co. Lands, 17 copper claims and 18 gold claims, 3 groups of copper claims being on Stone creek, in the Ruby mountains. Property has a 60-ton concentrator and a 30-ton smelter. No trace of operations secured.

TOLTEC MINE.

MICHIGAN

Idle many years. Office: care Alfred Meads & Sons, owners, Marquette, Mich. Mine at Greenland, Ontonagon Co., Mich. Lands, 320 acres, carry the underlay of the Evergreen belt and the Calico and adjacent beds of the Michigan. Production, 1851-60, was 413,443 lbs. fine copper. Some diamond drilling was done, 1908.

TOM MOORE MINE.

UTAH

Office: 12 West First South St., Salt Lake City, Utah. Mine office: Bingham Canyon, Salt Lake Co., Utah. A. M. Surbaugh and Thos. Moore Surbaugh, owners. Lands, 39 claims, 22 patented, 600 acres, with direct rail connection, in the N. E. part of the Bingham camp. The mine has 16 shallow shafts and short tunnels, principal development being by the Highline tunnel, with another tunnel driving at lower depth. The mine carries gold and silver-bearing lead and copper ores, with small quantities of native copper, in quartz. Owners do not care to have output or other details made public.

TONOPAH LIBERTY MINING CO.

NEVADA

Office: 1020 Arcade Bldg., Philadelphia, Pa. Mine address: C. R. Olson, mgr., Tonopah, Nev. Chas. A. Smith, mine supt. Property, the Burbank group, 28 miles N. of Tonopah, shows veins of silver-gold ore with shoots of copper ore. Development is by a 460' shaft with various levels. A shipment of 19 tons of \$36 copper ore was made Oct., 1913. Equipment includes electric power, air compressor, 10-stamp mill, with Chilean and tube mills, and a 100-ton cyanide plant.

TOPEKA CONSOLIDATED MINING CO.

COLORADO

Office and mine: Central City, Gilpin Co., Colo. Henry P. Lowe, pres., treas. and gen. mgr.; C. A. West, sec.; preceding officers, Sir Chas. Allen, Arthur Firth and M. A. Lowe, directors; Robt. Wilkinson, gen. supt. Organized July 30, 1909, under laws of Colorado, as successor of Topeka Mining Co., capitalization \$1,000,000, shares \$5 par, nonassessable, fully issued. Annual meeting, June 30.

Lands, 7 claims, patented, 16.46 acres, in the Russell district, show schists and metamorphic gneiss, cut by 3 veins with N.-E. strike and dip of 45°. One vein of 4' average width, traceable 1,300', carries chalcopyrite and sphalerite estimated to average 0.5% copper, 2% zinc, 2 oz. silver and \$10 gold per ton. The mine has a working shaft 1,500' deep, with a second 510' shaft and a total of 11,640' of workings, estimated to show 50,000 tons of ore. The mine was discovered 1862, and worked at intervals until 1900, when closed by litigation, until reopened Aug., 1909.

Equipment includes steam plants, with a 250-h. p. hoist at No. 1 shaft, and a 60-h. p. hoist at No. 2 shaft. There is a 7-drill Rand Imperial 2-stage air compressor and 15 hammer drills are used. There is a dressing

plant having 200-ton storage bins and a sorting floor with grizzlies, from which ore is loaded direct into railway cars. Property considered a promising gold mine, and management good.

TOQUIMA COPPER CO.

NEVADA

Office and mine address: P. O. Box 9, Manhattan, Nye Co., Nev. W. J. Stock, pres.; Omer Maris, vice-pres. and mgr.; F. P. Jayne, sec.-treas.; preceding officers, J. B. Giffen and L. W. Haworth, directors. Organized Aug., 1906, under laws of South Dakota, capitalization \$1,000,000, shares \$1 par.

Property, 7 claims, 120 acres, about 35 miles E. of Manhattan, the nearest rail point, shows a mineralized zone of about 600' width, traceable 2,000'. The outcrop shows altered schists and coarsely crystalline limestone with irregular iron patches, ferruginous, highly friable limestone and quartz, all showing carbonate copper stains.

Development is by a 180' incline shaft on the footwall of the mineralized zone, this work develops a little ore with bornite and chalcoppyrite below a depth of 20'. Equipment includes a small electric plant, Cornish pump and whini.

TORCH LAKE MINING CO.

MICHIGAN

Idle since 1900. Office: 5-19 Exchange Place, Boston, Mass. Mine office: Leopold Bldg., Houghton, Houghton Co., Mich. Thacher Loring, pres.; Chilton Cabot, sec.; Frederick W. Nichols, agt. Organized under laws of Michigan, capitalization \$500,000, shares \$25 par, assessable. Lands, 1,280 acres, being Secs. 35 and 36, T. 56 N., R. 33 W., lying east of the Tecumseh mine of the La Salle, and about midway between Calumet and Lake Linden. The property was slightly prospected, 1899-1900, by diamond-drill borings.

TORPEDO MINE.

NEW MEXICO

Address: Organ, Dona Ana Co., N. M. Geo. E. Fitzgerald, manager. The mine is an old one with a reported production of \$600,000. Property includes several claims covering a contact between limestone and granite, having lenticular orebodies with chalcoppyrite. Mine was formerly owned by Torpedo Mining Co., but closed down 1903, owing to heavy inflow of water and reopened 1913, by Chicago capitalists.

TORREON, S. A.; COMPANIA METALURGICA DE.

MEXICO

Office and works: Torreón, Viesca, Coahuila, Mex. Ernesto Madero, pres. and gen. mgr., at last report. Col. Carlos Gonzales, vice-pres.; Lic. Pragedis de la Peña, sec.; Lic. Pedro Torres Saldeña, treas.; preceding officers, Evaristo Madero, Tomás Mendirichaga, Mauro de la Peña, Rómulo Larralde and Joaquin Serrano, directors; Joaquin Villegas, comisario; F. S. Villareal, asst. gen. mgr.; Donald R. Morgan, gen. mine supt.; Ivan Ragaz, asst. mine supt.; Ernesto Harms, gen. smelter supt.; J. Arthur Rule, asst. smelter supt.; Chas. Moser, J. W. Pender, Pedro Vota and Pablo Gaudin, mine supts.

Organized June, 1901, under laws of Mexico, capitalization 1,250,000 pesos, increased 1903, to 1,750,000 pesos, 1904, to 3,500,000 pesos, and again increased 1905, to 5,000,000 pesos, shares 100 pesos par. in 1,500,000 pesos 6% preferred redeemable stock, and 3,500,000 pesos common stock. The company maintains a large cash working capital, and has been controlled by the Madero family. Profits were 629,279 pesos in 1904, and 775,285 pesos in 1906. Dividends were 20% in 1902; 18% in 1903; 14% in 1904; 12% in 1905; 12% in 1906; none in 1907 or 1908; 6% in 1909.

Company owns a number of lead mines and several partly-developed copper mines, in northern Mexico. The San Diego and Buena Suerte mines at Santa Barbara, Chihuahua, produce galena and sphalerite ores, treated in

a 125-ton concentrator, and employ about 250 men. Las Adargas mine, Jiménez, Chihuahua, has auriferous silver-lead ores; La Voladora and La Mitra mines, in Nuevo León, produce silver-lead ores; Las Cabrillas and Las Higueras mines, at Los Muertos, Centro, Coahuila, produce silver-lead ores and also have promising deposits of iron ore.

The smelter, of 1,250 tons rated daily capacity, having connection with all railway lines entering Torreón, treats the large production of the company's own mines and also does an extensive general custom business on gold, silver, lead and copper ores, and has ore-purchasing agencies in the leading mining camps of northern and central Mexico. The smelter has 10 blast furnaces, including eight 100 metric ton silver-lead stacks, and two 250-ton copper stacks, the blast furnaces using mechanical charging. There are 8 reverberatory roasters, for lead matte, the first-fusion product carrying only 10 to 15% lead, which is calcined and resmelted. The works have a converter plant, installed 1907, of 15 metric tons daily capacity, increased early 1910, to 30 tons daily capacity. Water is furnished by 3 large wells. The works employed about 600 men.

Ore treated by the smelter was 71,294 metric tons in 1901; 201,612 metric tons in 1904; 258,572 metric tons in 1906; 277,594 metric tons in 1907 and 294,394 metric tons in 1908, showing a continuous and gratifying growth. This company went through the 1907 panic in better shape than perhaps any other Mexican smelting corporation. The company is one of the most successful and well-managed mining and smelting enterprises in the republic, its success being especially interesting because the works are owned and controlled by Mexicans, who have shown their ability to compete, on even terms, with the ablest American and European mining men and financiers. Property was operated throughout 1912, but was forced to close down during the fighting that continued in this district, 1913.

TORRETTE GROUP.

ARIZONA

John Miller, owner. Constellation, Yavapai Co., Ariz. Property adjoins the Monte Cristo silver mine and the Arizona Copper Belt mine. Claims show 7 parallel ledges, 1 to 40' wide, said to carry 5 to 27% copper and \$6 to \$35 gold.

TORTILLITA COPPER CO.

ARIZONA

Office: 32 N. Stone Ave., Tucson, Ariz. Mine at Red Rock, Pinal Co., Ariz. Hon. Nott E. Guild, pres. and mgr.; Geo. F. Kitt, vice-pres.; Hon. John B. Wright, sec. and counsel; John W. Estill, treas.; preceding officers and F. Ronstadt, directors. Organized March, 1912, under laws of Arizona Territory, capitalization \$1,000,000, shares \$1 par. Company is a reorganization of the Calumet-Pinal Mining Co.

Property, the Cloud Burst and Yankee Girl mines, 17 claims, 340 acres, about 15 miles from Red Rock. The mines show 3 orebodies occurring at contacts between andesite and schist. One vein being developed is reported by management to average 20' in width, traceable for 4,000' and proven to depth of 330'. Surface shows carbonates, oxides and malachite, changing to copper glance with depth.

Developed by 2 shafts, 300' and 94' deep, with 500' drift and a 30' winze on 300' level. This drift follows a strong wall and is said to expose chalcocite. A crosscut from the winze opened 27' of shipping ore. Management plans to sink new shaft 100'. Apparently no equipment has as yet been installed, besides hoist and blower being used at the Yankee Girl mine.

TOTTENVILLE COPPER CO.

NEW YORK

Works at Tottenville, Richmond Co., N. Y. W. M. David, superin-

tendent, at last accounts. Is a smelting plant and factory for working copper and brass into commercial forms.

TRAIL SMELTER.

BRITISH COLUMBIA

Owned by Consolidated Mining & Smelting Co. of Canada, Ltd.

TRAMP MINER MINING CO.

NEVADA

Address: Mine supt., St. Thomas, Clarke Co., Nev. Property, 17 miles from the Colorado river and from the terminus of the Moapa-St. Thomas branch of the S. P., L. A. & S. L. R. R. Property shows a vein carrying high-grade ore and also a large deposit of iron ore with low copper values. Development consists of a 350' tunnel, opening up ore returning 34% copper from shipments said to have been made in 1913. The iron ore is reported to carry 51% iron and 3% copper. Property is in a district which is considered promising.

TRANSCONTINENTAL SILVER & COPPER MG. CO., LTD. IDAHO

Company abandoned property 1912, on account of title controversy. Formerly at Mullan, Shoshone Co., Idaho.

TRANSVAAL COPPER MINING CO., S. A.

MEXICO

Is the Mexican incorporation of the Transvaal Mining Co. of Utah.

TRANSVAAL MINING CO. OF UTAH.

MEXICO

Office: 1410 Traction Bldg., Cincinnati, Ohio. Mine and works office: Cumpas, Sonora, Mex. Louis J. Hauck, pres.; Percy Andreae, first vice-pres.; Theo. M. Foucar, second vice-pres.; Alfred Vogeler, sec.-treas.; preceding officers, Louis Hehman, J. M. Eilers, Leo. G. Cloud, Bernhard Freiberg and Solon Spiro, directors; H. C. Beauchamp, gen. mgr.; S. R. Pratt, supt.; Arthur Houle, cons. engr.

Organized Dec. 19, 1908, under laws of Utah, as a reconstruction of the Transvaal Copper Co., capitalization \$6,200,000, shares \$10 par; issued 540,000 shares. Bonds, \$650,000, authorized, at 6%; issued \$497,600. Annual meeting, first Tuesday in March.

Property, 5,560 acres of mineral land, including a 50-acre smelter site with 75-acre townsite adjoining; La Piedra Verde ranch of 15,000 acres and an interest in the San Nicolas Tolentino ranch, 26,000 acres, including timber and grazing lands.

The company's holdings cover the heart of a mountainous district showing widespread rock alteration with acid stream waters, bleached and iron-stained areas, and "chimneys" or "pipes" of silicified breccia. The tract shows granitic exposures, part of an underlying batholith, cutting recrystallized volcanic breccias, baked by contact action. In the Transvaal mines, both granite and this cover of fragmental rock are cut by irregular mineralized fractures along which orthoclase, carrying chalcocopyrite, fluorite, chlorite and calcite have been deposited by pneumalytic action. The "pipe" or "chimneys" of brecciated material cemented by quartz, are mostly barren, but in some cases, as at La Verde and Cobre Rico, contain workable copper ores. It is a peculiar type of deposit and resembles the Calumet-Copper Creek deposits of Arizona, the Kamloops mine in British Columbia and the neighboring Washington mine, 4 miles W. of the Cobre Rico property.

Extensive drilling at La Verde, or the Transvaal mine proper, has developed a great tonnage of low-grade primary ore, averaging $1\frac{1}{2}\%$ copper and estimated by the management at 3,000,000 or more tons, which will doubtless be treated some day by flotation methods. The drills have shown the ore to extend to a depth of 1,100'.

The Cobre Rico mine has 2 shafts, No. 1 of 100' and No. 2 about 140' deep, with several tunnels and about 16,400' of workings, including diamond drilling developing several orebodies in a mass of brecciated rock, locally

called trachite. Ore is estimated to average about 2% copper, 1 to 2 oz. silver and a trace of gold. Management estimates 2,500,000 tons available in this mine.

The Transvaal or Verde mine has shafts, 318' and 210' deep, former the main working shaft with about 5,000' of drift and crosscut work including several tunnels. This development has opened up considerable low-grade ore carrying chalcopyrite which can only be treated by concentration. Development near the mine by diamond-drill work has shown the existence of a large body, or bodies of primary ore, the cores varying from a trace up to 17.85% copper and 46.8 oz. silver for 2' at 1,032' depth. About 10,000' of drill work had been done up to March, 1913, which shows that the ore-body is somewhat irregular in shape and spotty in character but of fair average value.

Equipment at the Verde shaft includes two 80-h. p. boilers, a steam hoist and air compressor. The water supply at this mine is bad, owing to its acidity. Management estimates between three to four million tons of concentrating ore available at this mine.

The Buckeye mine has about 10,000' of tunnel work, on a blanket vein of 6" to 4' thickness, showing ore reported to have given average returns of 12% copper and 8 to 10 oz. silver, with a trace of gold. There are about 5,000 tons of high-grade ore left in the mine and a considerable amount of low-grade ore of no present commercial value. The mine, however, has been thoroughly explored in the bottom, or lower tunnel level and the ore shoot found to have played out.

The San Nicolas mine is a silver property about 8 or 10 miles from the Transvaal. It shows a vein along an igneous contact varying from 1 to 4' in width, carrying silver-lead ore said to change to copper in the lower workings. The mine is reported to have yielded 6,000 tons of 60 oz. silver ore and still has between 2,000 and 3,000 tons of 50-oz. silver ore, but is locally regarded as practically worked out, though the limited amount of development work does not disprove the downward extension of the ore shoot. It is regarded as a promising prospect, especially for lateral development.

The Ultima Chanza mine has a 300' incline shaft and a 100' winze, with about 5,000' of workings, developing a fissure vein of 10 to 42" width. The management estimates 50,000 tons of ore in sight, averaging 10% copper, 5 oz. silver and a trace of gold. This property is a good, but small mine, needing further development. Equipment includes a steam plant and hoist.

The Guadalupe mine carries cupriferous iron ore, used for flux.

The nearest rail station is at Nacozari, 30 miles north, but the Cananea, Rio Yaqui y Pacifico railway has surveyed a line to within 9 miles of the smelter. The company has built about 35 miles of wagon roads and 25 miles of trails at a cost of \$50,000, with a maintenance charge of about \$5,000 yearly.

The main camp is at La Verde, 25 miles S. W. of Cumpas, where mining operations are centered. There are 20 buildings, including 3 power plants, a 30x75' machine shop, 30x30' carpenter shop, smithies at the principal mines, 2 laboratories, a boarding house, a 22x90' general store, with a branch store at the smelter, a hospital, and several dwellings. The company has a telephone system, costing about \$5,000.

The smelter, at Cumpas, at an average distance of about 25 miles from the mines, was located at that point because of a good site and ample water supply, both lacking at the mines. Equipment includes a 125-ton 42x120" El Paso Foundry & Machine Works water-jacket blast furnace,

with room for 2 additional furnaces of the same size, 1 of which was under erection, early 1911. There is a reverberatory furnace, variously rated by the company as of 20 to 50 tons daily capacity, and the works have a sampling mill, capable of sampling ore to feed 3 furnaces. The smelter power plant includes three 80-h. p. Babcock & Wilcox boilers, an Allis-Chalmers tandem-compound engine and a Connersville blower. This smelter was blown in, May 1, 1906, treating ores from the Buckeye and San Nicolás mines and doing a little custom business, producing matte shipped to the Laurel Hill works of the Nichols Copper Co., that was variously reported by the company as averaging 40% copper, 100 oz. silver and 0.5 oz. gold per ton and as averaging 37% copper, 140 oz. silver and 0.1 oz. gold per ton. The smelter was blown out, Oct., 1907, and has been idle since.

From May 1, 1906, to Nov. 3, 1907, a period of 18 months, the smelter, in operation about two-thirds of the time owing to scarcity of freighting outfits, smelted 18,550 tons of ore having an average assay tenor of about 10% copper and 8 oz. silver for copper ore, and 2% copper and 60 oz. silver for silver ore, making 3,089 tons of matte, yielding 2,178,855 lbs. fine copper, 407,607 oz. silver and 240 oz. gold.

The extensive development work done on the property since 1909, shows the existence of small veins of rich ore and large deposits of low-grade ore. The property is a valuable one and will be worked on a large scale when given the rail connections now lacking, but absolutely essential to the successful exploitation of the ores.

TREADWELL MINING CO.

ARIZONA

See George A. Treadwell Mining Co.

TREMONT & DEVON MINING CO., LTD.

MICHIGAN

Idle. Office: First National Bank Bldg., Hancock, Mich. Mine at Victoria, Ontonagon Co., Mich. Hon. Chas. Smith, pres.; Fred H. Begole, vice-pres.; Chas. D. Hanchett, sec.-treas.; preceding officers, Jos. Bosch, Jas. B. Cooper, Henry L. Baer and Robt. T. Dunstan, directors. Organized Dec., 1908, under laws of Michigan, capitalization \$250,000, shares \$25 par, 100,000 issued; two 10-ct. assessments levied to date.

Lands, 680 acres, freehold, including the old Tremont and Devon mines, adjoining and directly W. of the Victoria, carrying about 1¼ miles of the strike of the Keweenawan copper formation, and apparently in the horizon of the western extension of the Lake bed. The Victoria has a vein of some promise, outcropping about one-half mile from the Tremont & Devon line. A little work was done, in olden days, on shallow shafts near the center of the property, from which rock was taken, said to have yielded 500 lbs. fine copper per fathom of ground broken, which was better than 25 lbs. of finished copper per ton.

TRENCH CONSOLIDATED MINES CO.

ARIZONA

Address: 207 Felt Bldg., care Salisbury Co., Salt Lake City, Utah. C. B. Felt, secretary. Property, also known as the Farrel mine, is near Patagonia and Harshaw, Santa Cruz Co., Ariz. The mines are now under bond to Senator W. A. Clark, for 2 years, at a price said to be \$250,000. Work was started with D. Hogan as superintendent, late in 1912.

TRENTON MINING CO.

ARIZONA

Office: care J. L. Gillingham, sec.-treas., 154 Nassau St., New York. Mine address: care S. F. Noon, Nogales, Santa Cruz Co., Ariz. Melvin Stephens, pres.; Jas. Van Sicken, vice-pres.; preceding officers, Abraham Van Sicken, Peter Van Sicken, Henry W. Mason and Chas. W. Henderson, directors. Capitalization \$500,000, shares \$1 par, in \$300,000 of 7% preferred

and \$200,000 common stock. Company purchased the lands of the Arizona Gold & Copper Co. and paid the indebtedness of the latter.

Lands, 13 claims, 175 acres, 8 miles W. of Patagonia, in the Tyndall district, having about 1,200' of workings, with several shafts and a tunnel, latter showing a vein of 12' estimated width, carrying gray copper and silver-lead ores assaying 3% copper, 3 to 15% lead and up to 10 oz. silver per ton. Smelter returns, from shipments to El Paso, have given up to 2% copper, 47.8% lead and 52 oz. silver per ton. The reduction plant, on a 20-acre tract at Patagonia, includes a sampling mill or concentrator, and has been said to include an 80-ton smelter.

TRENTON-SONORA MINING CO.

MEXICO

Office: Trenton, N. J. Mine office: Tarachi, Sonora, Mex. L. Laurent, mgr.; F. Acock, supt., at last accounts. Lands, 4 miles S. of La Calera, include the San José, Santa Eduvigis, El Porvenir and other mines, carrying copper ores, with values, mainly in silver. The San José mine is reported to show an 18" paystreak of highly auriferous chalcopryite. Development is by a 200' shaft, sunk on the vein, equipped with a hoist. There is a mill and a smelter. Probably idle owing to Mexican revolution.

TRES SEÑORES MINING CO.

MEXICO

Mine at San Pedro Ocampo, Zacatecas, Mex. Property includes La Providencia and La Poderosa mines, near San Pedro Ocampo, yielding ores that have given smelter returns of 10% copper, 3,234 grams silver and 120 grams gold per metric ton. Was a small producer at last accounts. Letters returned from Mexican border, 1913.

TRIANGLE MINING & DEVELOPMENT CO.

MONTANA

Office: 8 Allen Blk., Missoula, Mont. Mine office: Clinton, Missoula Co., Mont. Dr. Frank C. Robb, pres.; Oliver Blood, vice-pres.; H. Y. Gephart, sec.-treas.; Robt. B. Hughes, gen. mgr. and supt.; preceding officers, David C. Smith, E. C. Mulroney, and Geo. E. Sullinger, directors; Henry E. Kuphal, engr. Organized Aug. 25, 1906, under laws of Montana, capitalization \$500,000, increased later to \$1,200,000, shares \$1 par, non-assessable; issued \$662,808. Debentures, \$150,000 6%, none issued. Annual meeting, third Monday in February.

Lands, 13 claims, unpatented, 250 acres, well-watered and partly timbered in the Wallace district, 2½ miles from a railway, in 3 groups, known as the Triangle group of 8 claims, and the Hill group of 5 claims, 2 miles N. E. of Clinton and 17 miles E. of Missoula. The company also owns several lots of land in the town site of Clinton, and holds a perpetual lease on the upper workings of the Hidden Treasure mine, about one-half mile from the Triangle, at a royalty of 30% of the gross assay value of ore extracted.

The claims contain a number of fissure veins cutting granite and altered sedimentary rocks near the contact with a large batholith of granite. The veins show chalcopryite and bornite associated with hematite, siderite, and quartz in altered granite. There are 3 veins on the Triangle group, the largest, a 16' vein, opened by a 540' tunnel with back of 450'. At the face the vein is 14' wide and assays 2% copper, ½ oz. silver and 40 cts. gold, while an 8" streak averages 15.04% copper, 3.20 oz. silver and .24 oz. gold, and a 4' footwall streak averages 4.65% copper, 1.2 oz. silver and 80 cts. gold.

Development on the Triangle consists of a 140' crosscut and 540' drift tunnels and 40' shaft, estimated to block out 25,000 tons of \$14 ore. The Grass Widow claim has 513' of crosscutting and 300', 75' and 100' drifts. The Hill group has a 300' drift tunnel. The Hidden Treasure, a 21' quartz

vein, is said to be opened by 740' of tunnel work exposing 100,000 tons of ore in place, with 10,000 tons broken, valued at \$15 per ton.

Equipment includes a 40-h. p. boiler and an Ingersoll-Rand air compressor, besides several mine buildings. Management plans installing electric power, erecting a 50-ton concentrator and driving a new 1,800' tunnel, 500' below the old workings.

TRI-BULLION SM. & DEV. CO.

ARIZONA & NEW MEXICO

Office: 2 Rector St., New York. Mine office: Kelly, Socorro Co., N. M. Howard Paschal, pres. and gen. mgr.; Scott E. Welker, Ellis P. Earle and Hon. John B. Corliss, executive committee; preceding officers, F. W. Anness, Allen Curtis, Louis O. Hedden, Leonard J. McAneny, R. J. Marshall and L. J. Pierson, directors; Geo. R. Shidle, first vice-pres.; John F. Skeel, second vice-pres.; Harry J. Clarke, sec.-treas.; Robt. W. Bull, acting gen. mgr.

Organized 1903, under laws of Arizona, capitalization \$5,250,000, shares \$1 par, in 250,000 participating cumulative 12% stock, with 5,000,000 common; issued 34,653 preferred, and \$4,997,500 common.

Property includes the Kelly mine, for many years the company's principal asset, which is a zinc, lead and copper producer in New Mexico; also the Starlight group of copper claims in Arizona and a 150-acre group of gold-silver claims in the Pipestone district, Jefferson county, Mont. The Montana property has about 800' of shaft work but is idle save for annual assessment requirements.

The Starlight group of 12 patented copper and lead claims, in Godless gulch, in the Stanley Butte district, 8 miles S. of the San Carlos Indian agency, was discovered 1886, but not opened until 1903, because it was a part of the San Carlos Indian Reservation, previous to its segregation in 1901. This property shows quartzite, granite and limestone, with short veins, carrying replacement deposits, of 3' estimated average width, holding oxidized ores, estimated by company to average 8% copper, 40% lead, 10 oz. silver and \$3.50 gold per ton. The ore being low in silica, and rich in lime and iron, is self-fluxing. Development is mainly by a 1,700' crosscut tunnel exposing low-grade orebodies. There are also 2 shafts of 140' and 150' respectively. Ore shipments from the Starlight group 1906, returned 4 to 12% copper, 40 to 50% lead, 10 oz. silver and \$3.50 gold per ton, with smelter returns aggregating \$15,900.

The Kelly mine, the company's main property, has an area of 350 acres, patented, showing veins of ore yielding lead and zinc carbonates in the upper workings, running from 25 to 30% lead with small silver values and 25 to 40% zinc. The sulphide ores occurring in depth, give average smelter returns of 25 to 35% zinc, 12 to 15% lead $\frac{1}{2}$ to 2% copper and 6 to 8 oz. silver per ton. The development includes the 400' Traylor shaft and a 365' accessory shaft.

The Nit and Silver Bell groups were acquired in 1912. The Nit mine, adjoining the Graphic, has an underground connection with the Waldo mine of the Ozark Smelting & Milling Co. The workings of this mine disclose a 50' vein of 4.7 to 6% copper ore, 454' E. of the 215' shaft, in a crosscut from the bottom of a 45' winze sunk from the bottom level.

The Kelly mine has a power house with three 150-h. p. boilers, a large first-motion hoist, 15-drill air compressor, electric pumps and electric light plant. An aerial tram, built 1912, connects the Paschal and Grand Tower (or Legal Tender) shafts.

The concentrating mill of 100 tons capacity includes a 75-ton magnetic plant equipped with roasters and Ding electric separators for parting the zinc and iron sulphides. This plant has been in successful operation for

several years. The output of the property comes mainly from the Kelly workings, but a tramway to connect the Nit and Silver Bell properties with the mill will increase the production from those mines in 1913 and 1914.

Production for the year ending Oct. 31, 1912, was 14,117 tons of ore mined and milled, compared with 21,743 tons in 1911. This ore, however, had a total value of \$319,487, compared with \$221,058 in 1911. The metallic production for 1912 included 9,243 tons zinc concentrate, 2,060 tons of lead concentrate, 956 tons of iron middlings, 1,552 tons zinc carbonate, 31 tons of zinc sulphide ore and 266 tons of copper ore. The net profit for the year is reported as \$71,307.

The Kelly mine is reported to be practically worked out and the operations from Nov., 1912, to July 7, 1913, resulting in a loss and consequent debt of over \$30,000, the mine was shut down on the latter date and is still idle. A proposition to sell the Kelly group of 15 claims, with all its equipment and power plant, for \$87,500, was submitted to the stockholders in Sept., 1913, and the sale approved. The cash balance after all debts are paid, will be used to develop the copper deposit found on the Nit group and to do prospecting work on the Starlight group near San Carlos, Ariz.

TRI-METALLIC MINING, SMELTING & REFINING CO. MEXICO

Idle. Address: P. Sandoval, treas., Nogales, Sonora, Mex. Mine near Tonichi, Sonora, Mex. J. L. Shepard, pres. Lands, 9 groups of claims, including the Creston de Cobre mine, 6 miles from Tonichi, the nearest rail point, in the Ures and Hermosillo district. The Creston de Cobre mine has a shallow shaft, and a crosscut tunnel, developing auriferous and argenteriferous copper ores.

TRIMOUNTAIN MINING CO.

MICHIGAN

Office: 82 Devonshire St., Boston, Mass. Mine office: Trimountain, Houghton Co., Mich. Wm. A. Paine, pres.; Frederic Stanwood, sec.-treas.; Frederick W. Denton, gen. mgr.; preceding officers, J. Henry Brooks, Chas. A. Snow, R. Townsend McKeever and John R. Stanton, directors; John Jolly, supt.; Edw. Koepel, mill supt.; H. T. Mercer, engr.; Benj. D. Noetzel, clerk; Richard Bowden, mg. capt.; Wm. J. Richards, master mechanic.

Organized 1899, under laws of Michigan, capitalization \$2,500,000, shares \$25 par, paid in \$20. Is controlled, through ownership of 99,335 shares, by Copper Range Consolidated Co. Old Colony Trust Co., Boston, registrar. Annual meeting, second Wednesday in May.

Dividends have been \$3 in 1903, \$5 in 1908, \$1.50 in 1910, \$3 in 1912.

Balance of assets Jan. 1, 1913, was \$531,394, including cash and copper amounting to \$266,479.

Lands, 1,120 acres, being the E. $\frac{1}{2}$ of Sec. 19, W. $\frac{1}{2}$ of Sec. 20, N. $\frac{1}{2}$ of Sec. 29, and N. E. $\frac{1}{4}$ of Sec. 30, all in T. 54 N., R. 34 W. The Baltic mine lies to the N. and the Champion to the S., with undeveloped lands to the E. and W.

Owing to a very heavy sand overburden the mine was opened by dropshafts sunk through alluvium, with raises to surface on the angle of the dip of the stratified formation. The Baltic bed runs 15 to 50', with an average width of 25', on the Trimountain property. Heavy copper is found near the walls, and masses upwards of a ton in weight have been found, but values occur mainly disseminated in stamp rock.

The Trimountain shafts enter lean streaks or shoots, sometimes 500' in horizontal length, with flat northerly pitch or rake, underlain by copper ore. Lying parallel with and about 65' W. from the Baltic bed, is a wide amygdaloid, carrying some heavy copper and considerable stamp rock. This bed has not yet been worked, but may be made available for production at some time in the future. The great width of the lode has led to dry-walling

with waste rock, which is used also for building underground chutes, which are roughly circular, with inner diameter of about 5' and are filled about with waste, as stopes are carried upward, the chutes being built at a sharp pitch, the wedging of the surrounding waste rock serving to hold the walls immovable. The saving in timbering brought about by dry-walling and building chutes of waste rock is very great. The mine has electric pumps and works about 60 drills.

Shafts are all of the same size and style, being 8x22' outside of timbers, with 3 compartments, framed with 14x14" sticks, exceptionally heavy timbering being required to withstand the pressure of shifting sand above the solid rock.

Good ground has been opened on the 10th to 20th levels, inclusive, in Nos. 3 and 4 shafts; No. 2 shaft shows excellent ore below the 21st level.

No. 1 shaft, 210' north of the Champion boundary line, is sunk at an angle of 68°, and has a sand overburden of about 40' depth, with 1st level opened 168' below the collar, with levels thereafter at 100' intervals. The upper levels tributary to No. 1 shaft have been worked out, and the shaft permanently abandoned at depth of 2,284'.

No. 2 shaft, 1,023' N. E. of No. 1, was 2,742' deep at the end of 1912, and a considerable improvement has been noted in ground below the 14th level, with the bottom levels the best opened in this shaft. The shaft rock house, 40x62' on the ground, and 84' high, of steel frame, iron-sheathed, has 2,000-ton rock bins, and is equipped with an engine, steam hammer and two 18x24" crushers. Rock is raised by a 2,500-h. p. 36x72" Nordberg direct-connected duplex hoist, with double-conical drum of 18' maximum diameter, capable of raising 6-ton skips from 1 mile depth.

No. 3 shaft, 1,027' N. E. of No. 2, sunk at an angle of 68°, was 2,267' deep at the end of 1912. Beneath 60' of sand, the rock was found to be badly fractured and barren down to the 2nd level, only becoming solid and payable below the 14th level. Equipment includes a shaft rock house and hoist, duplicates of those at No. 2.

No. 4 shaft, the northernmost, 2,191' deep at the end of 1912, is the best shaft of the mine. No. 5 shaft is merely the site for a shaft, there being an overburden of sand mixed with boulders, 208' deep. No. 6 also is a tentative site for a shaft, so located as to develop the Trimountain territory to the Baltic line.

The mine buildings near shafts Nos. 2 and 3, include machine and carpenter shops, smithy and warehouse. There is a 35-drill Rand air compressor at No. 2 shaft, with a Deane condensing plant in a separate building. The power plant at No. 3 shaft includes a battery of Stirling water-tube boilers and a 4,500' Nordberg air compressor. The mine is served by the main line of the Copper Range railway, which reaches all the shafts and principal shops.

The mine property has macadamized roads, a large boarding house, upwards of 100 dwellings, general store, hospital and a nurses' home.

The 176x205' mill, at Beacon Hill, 2 miles west of Redridge, occupies a 100-acre mill site having about 2 miles of frontage on Lake Superior. The mill has 4 steeple-compound Nordberg stamps. Complementary machinery for each stamp includes crushing rolls, 36 improved Hodge jigs, 6 slime tables and 1 Wilfley table. Tailing losses, originally as high as 0.50 to 0.65%, have been reduced to 0.26%, by the installation of regrinding rolls and settling tanks. The mill is also equipped with regrinding machinery, including Hardinge mills, for treating the richer portions of the mill tailings. The mill has a 300-h. p. engine, and a small but complete machine shop on the second floor.

The mill boiler house, of steel, has six 250-h. p. and two 200-h. p. Stirling boilers, the latter maintaining a steam pressure of 180 to 200 lbs. per sq. inch. The boiler plant has a self-supporting brick-lined steel smoke-stack, 165' high and 7' 6" in diameter. At the rear of the boiler house are 3 coal-trestles, under each being a 6x7' tunnel, 400' long, leading to the boiler rooms, the floors of the sheds forming the roofs of the tunnels.

The steel-frame pump house at the mill has a 20,000,000-gal. Nordberg pump, taking water from a well connected with a tunnel running 1,960' to an intake crib in Lake Superior.

The town site of Beacon Hill, lying on the slope above the mill, has a number of dwellings lighted by electricity, supplied by a generator in the mill engine room.

Production was begun Jan. 4, 1902, with 1 leased head at the Arcadian mill. The Trimountain began production with a return of 37 lbs. fine copper per ton, but fell off later to 27 lbs., and, when the present management secured control, the production fell sharply to 18 lbs. fine copper per ton. Returns from rock stamped were 18.43 lbs. fine copper per ton in 1907; 18 lbs. fine copper per ton in 1908; 16.58 lbs. in 1909; 17.5 lbs. in 1910; 17.59 lbs. in 1911, and 19.04 lbs. in 1912.

Production has been as follows: 1902, 5,732,160 lbs. copper; 1903, 9,237,051 lbs.; 1904, 10,211,230 lbs.; 1905, 10,476,462 lbs.; 1906, 9,507,933 lbs.; 1907, 8,190,711 lbs.; 1908, 6,034,908 lbs.; 1909, 5,282,404 lbs.; 1910, 5,694,868 lbs.; 1911, 6,120,417 lbs.; and 1912, 6,980,713 lbs.

TRINIDAD DE CHARCAS, S. A.; COMPANIA MINERA LA. MEXICO

Office: Espalda de Santa Veracruz 12, Mexico, D. F. Mine office: Charcas, San Luis Potosi, Mex. Lic. Jose Luis Requena, pres.; Luciano de la Rosa, mgr. Organized Oct. 1, 1903, under laws of Mexico, capitalization 300,000 pesos, shares 100 pesos par, increased by a later issue of 100,000 pesos, shares 50 pesos par, 10 pesos paid in.

Lands include the San Agustin, La Mascota, La Reina and El Rey mines. The San Agustin mine, 20 hectares, has an 80-meter shaft, developing silicious copper ores with values mainly in gold and silver. Another property has a 105-meter shaft. Equipment includes steam power. Was producing about 1 carload of ore daily, carrying 4 to 5% copper and 700 to 1,000 grams silver per metric ton at last accounts. No returns secured.

TRINIDAD MINING & SMELTING CO. WASHINGTON

T. W. Brown, superintendent, Tonasket, Okanogan Co., Wash. Property, the Central group, shows gold and silver-bearing lead-copper ores, developed by tunnels.

TRINITY COPPER CO. CALIFORNIA

Office: 33 State St., Boston, Mass. Mine office: Kennett, Shasta Co., Cal. Thos. W. Lawson, pres.; Arnold Lawson, vice-pres.; Homer Albers, sec.; Allen Arnold, treas.; Austin H. Brown, gen. mgr.; preceding officers, Arthur P. French, H. M. Shreve, John R. Turner, E. A. McSweeney, and Dr. Max Heicht, directors.

Organized Oct. 18, 1900, under laws of New Jersey, capitalization \$6,000,000, shares \$25 par. International Trust Co., Boston, registrar; Federal Trust Co., Boston, transfer agent. Shares are listed on the Boston Stock Exchange.

The balance sheet, as of Sept. 1, 1913, shows assets as follows: Mining claims, \$5,221,000; mine development, construction and interest account, \$679,872; expenses, \$194,344; Railway & Power Co., \$36,500; cash, \$3,525; total, \$6,135,240. Liabilities: Capital stock, \$6,000,000; American Smelting contract payable in ore, \$23,969; ore account, \$39,471; accounts payable, \$71,800; total, \$6,135,240.

Lands, 1,700 acres, also a patented town site, near Kennett, with total holdings of 3,233 acres, a smelter site of 422 acres, formerly owned, having been sold to the Mammoth Copper Mining Co. of Maine. Property includes the Shasta King, which is the principal mine, the Lost Desert group, and the King Copper group.

The Shasta King group, of 12 claims, adjoins the Balaklala mine, on the southern fork of Squaw creek, 4 miles east of Iron mountain. The main tunnel, 1,145' long, is 7x8' in size, with double tram tracks, and there is also a 7x8' double-track tunnel, driven 175' vertically lower. The mine has 15,000' of workings and the property has been tested by 5,119' of diamond-drill borings. The orebody is a lens, claimed to be approximately 150' wide by 1,000' long, but apparently the ore does not go to great depth, and it is possible that the bottom limits have been reached. The property has ore reserves of 400,000 tons, with fair chances of 750,000 tons, and possibilities of a greater tonnage. The crosscut tunnels, driven in from the sides of the mountain, connect with drifts on the orebody, which is low-grade pyritic ore containing disseminated chalcopyrite, and holding 1 to 2½% copper, with combined gold and silver values of about \$1 per ton. The ore carries small quantities of zinc and an excess of iron, and probably averages around 2½% copper and 1 oz. silver per ton, with small gold values. The Trinity also has an orebody, of undetermined size, on the opposite side of the gulch from the Shasta King.

The Shasta King mine has ore bins, and a 2,000' incline tram, of about 500 tons daily capacity, leading to the head house of the Balaklala tramway. The Copper King group of 22 claims, on Motion creek, about 2½ miles S. of the Shasta King mine, has about 1,000' of exploratory workings, but apparently no ore has been found in place. The Statesman group has been partially explored, in an effort to locate and develop silicious ores required for fluxing the heavy sulphide ores of the Shasta King mine. The Uncle Sam group, held under bond and lease at last accounts, also has been explored for fluxing ores, the Shasta King having large bodies of low-grade copper sulphide, but lacking the silicious ores required to make free-smelting furnace mixtures. The Uncle Sam group shows some oxidized ore, at and near surface, of 3 to 8% copper tenor.

Equipment includes a steam plant with 6-drill air compressor and power drills; also a diamond drill, with which considerable boring has been done. Buildings include a laboratory, warehouse, shops, hospital and about 25 houses for employes.

The company was reported to be ready for production Sept., 1907, at the rate of about 150 tons daily, but none of the ore reached the smelter. Management started production Oct., 1908, and shipped ore to the Balaklala smelter, but closed down early, 1909, and no record of the actual production of copper can be secured. The Trinity Co. claimed to have a contract with the Balaklala smelter calling for the treatment of 300,000 tons of ore for the first year and 360,000 yearly for the 9 succeeding years; with a minimum of 300 and maximum of 1,000 tons daily, which was to have been matted for \$3 per ton, but the contract was not carried out, and the mine has been closed down since Feb., 1909, waiting first for 15 ct. copper and now for the Balaklala smelter to resume operations. For the history of the company, see Vol. X.

President Lawson stated, at the annual meeting, 1913, that Trinity's day will come and that the property's decriers will be forced to "eat their born-of-ignorance criticisms." His statement was in part as follows: "Trinity is still awaiting the resumption of First National-Balaklala smelting operations, and if these efforts are successful, the unbroken chain of Trinity's mis-

fortunes should be at an end. Mining operations were entirely suspended during the year, but mine workings, machinery, buildings, roads and fire-protection apparatus have been maintained with a minimum of depreciation, considering the adverse conditions of a shutdown in a rugged, mountainous country, so that ore extraction may commence economically at short notice."

TRINITY GOLD MINING & REDUCTION CO. CALIFORNIA

Office: 175 Fifth Ave., New York. D. W. Shanks, gen. mgr., Los Angeles, Cal. Mines and works at Carrville, Trinity Co., Cal. Henry W. Miller, pres.; Archibald Nesbitt, vice-pres.; James H. Lee, sec.-treas.; preceding officers, John C. Hanson, H. M. Miller, Warren E. Green, Jos. J. Bonneau, Lincoln Bonneau, Wm. N. Croxton and John Eisele, directors. Organized Feb., 1909, under laws of Arizona, capitalization \$1,000,000, shares \$1 par; issued, \$969,220. Lincoln Trust Co., New York, registrar. Annual meeting, second Tuesday in January.

Profit and loss account for year ending Nov. 30, 1912, shows sales of bullion, \$198,403, compared with \$180,955 in 1911; net gross return for year, \$175,384; operating expenses, \$129,032; New York expenses, \$7,819; net profit for year, \$38,533, compared with \$66,265 for 1911.

Property, 498 acres, 323 patented, including the Headlight mine, in Trinity Center district, 1½ miles S. E. of Carrville. Company also owns 115 acres timber land. The mine has an orebody forming a flat shoot 40' thick but containing large dikes of disintegrated porphyry which did not show at the surface, so that the ore reserves reported by engineers do not exist and the oxidized ore has been worked out. A new orebody, found 1912, in another part of the property, has developed 100,000 tons of ore carrying ½ to 2% copper, 47% sulphur and about \$4.50 in gold and silver. This orebody has been proved by diamond drilling and by a 200' crosscut, finished March, 1913.

Equipment includes a complete power plant, stamp mill and concentrator which, in 1912, treated 47,600 tons of ore with a recovery of 81.88% at a cost of \$1.01 per ton. Mining costs were \$1.43 and the ore assayed \$4.36 per ton. Company is now experimenting with a wet process for the treatment of the sulphide ore as it cannot be roasted owing to the Government Forestry restrictions.

TROJAN MINE.

A. A. Anderson, superinendent. Situated in Orient mining district, Stevens Co., Wash. W. A. Kimmel, pres.; R. E. Cozzens, vice-pres.; W. F. Brown, sec.; all of Washington, D. C.; H. A. Fellows, treas.; Falls Church, Va. Property developed by 800' tunnel, intended to cut the vein at 500' level. Ore exposed in shallow workings contained values in gold, silver, copper and lead.

TROY MINING & MILLING CO.

Address: J. B. Gemmill, Troy, Latah Co., Idaho. D. H. Hilliard, C. A. Hillyard, W. O. Bond, of Clarkston; J. F. Tomlin and J. C. Edwards of Lewiston, incorporators. Organized about Nov., 1911, under laws of Idaho, capitalization \$1,000,000, shares \$1 par.

Property, 2 claims, about 2½ miles from Troy, in Bear Creek district, shows a vein reported to be 20' wide carrying copper ore with gold-silver values and assaying from \$12.50 to \$30 per ton.

TRUE FISSURE MINING CO.

MONTANA

Mine, 5 miles N. of De Borgia, Missoula Co., Mont. Wm. Trentesaky, pres. and supt.; Wm. Hart, vice-pres.; Geo. Batley, sec.-treas. Lands, 21 claims, having a 2,200' tunnel showing extensive orebodies of shipping ore, carrying mainly silver-lead ore. Equipment includes an air compressor. Eight men employed.

TUBAL-CAIN COPPER & MANGANESE MG. CO. WASHINGTON

Frank Hanford, pres. and treas., 211 Colman Blk., Seattle, Wash. Mine at Iron Mountain, Jefferson Co., Wash. I. A. Nadeau, sec.; Victor E. Tull, gen. mgr.; S. Marpel, supt., at last accounts.

Lands, 29 claims, 1 fractional, on Iron mountain, of the Olympic range, 40 miles from Port Townsend and 18 miles from a railway. The property is reported to show 5 veins, in a cross section of 1,800', one of which is claimed by the company to be nearly 200' wide at surface, and is otherwise reported as 11 to 96' in width, showing an altered compact iron-stained schist, bearing traces of copper, gold and silver. Other veins are said to show native copper, chalcocite and chalcopyrite, at surface. The center of the main or manganese vein is said to be a paystreak of 4 to 6' width, carrying native copper. Development was reported as by an 1,800' tunnel planned to cut all 5 veins. Equipment includes a Pelton wheel, taking water from the Dungeness river.

TUBE CITY MINING & MILLING CO.**ARIZONA**

Office: McKeesport, Pa., Mine office: Vekol, Pinal Co., Ariz. E. R. Zimmerman, superintendent. Property is the Jackrabbit mine, near Vekol, 22 miles south of Casa Grande, the nearest rail station. Development is by a shaft of 400' depth, with ores carrying values mainly in silver and gold. The mine is wet, having a Prescott high-duty triple-expansion pump on the 400' level, rated at capacity to lift 1,000 gals. per minute against a head of 1,000'. Equipment includes a steam plant. See Brownell-Arizona M. & S. Co.

TUCKER MINING & MILLING CO., LTD.**IDAHO**

Office: 25 O'Neil Bldg, Wallace, Idaho. Mine near Mullan, Shoshone Co., Idaho. Peter Bahn, pres. and gen. mgr.; Harry Harris, vice-pres.; W. W. Bixby, sec.-treas.; preceding officers, directors; Stanley R. Moore, engr., at last accounts. Organized March, 1907, under laws of Idaho, capitalization \$1,000,000, shares \$1 par, assessable; issued, \$700,000, given in exchange for the property. Annual meeting, second Saturday in April.

Lands, 6 claims, unpatented, 120 acres, in the Hunter district, 3 miles E. of the Snowstorm. The property shows Burke quartzite, cut by a diabase dike and showing veins, 1 up to 50' in surface width, traceable 800', carrying copper ore. Development by a 675' tunnel, shows a 4' vein, 85' from the portal, carrying low-grade copper and lead ore, and another vein, about 300' from the portal with stringers of high-grade copper carrying silver.

Equipment includes a hydraulic installation of about 100-h. p. Buildings are a 16x16' smithy, 16x16' carpenter shop and 16x26' bunk house, all of logs.

TUCSON CONSOLIDATED COPPER CO.**ARIZONA**

Office: 511 Chamber of Commerce, Milwaukee, Wis. Mine office: Tucson, Pima Co., Ariz. J. H. Wussow, pres.; Dr. M. A. Brandt, vice-pres.; F. J. Rodee, sec.; C. W. Schneider, treas.; Hon. Fred W. Fickett, gen. mgr.; preceding officers, J. G. Albright, C. F. Freeman, P. P. Donohue, A. Ballantine, R. L. Bennett and S. W. Purceil, directors. Organized April 15, 1907, under laws of Arizona, capitalization \$3,000,000, shares \$1 par, nonassessable, in one-half full paid and one-half common stock; issued, \$1,500,000. Annual meeting, third Monday in March.

Lands, formerly 103 claims, in 6 groups, 2,060 acres, now 81 claims, unpatented, in 4 groups, 1,620 acres, in the Papago district. The property of the Old Pueblo Mining & Milling Co., 9 claims, is held by this company under an option calling for 51% of stock on completion of \$50,000 worth of work.

The 4 groups are 8 miles W. of Twin Buttes and 35 miles W. of Tuc-

son. Claims show granite-porphry and limestone, with fissure veins and contact deposits, 5 being under development. The largest deposit is described as a chimney in limestone, about 55x150' in size. The groups as a whole have 3,800' of workings, mostly tunnels, longest 800', but including 10 shafts, deepest 525', estimated by management to show a large amount of ore, with considerable quantities blocked out for stoping. Property shows ores giving assays of 6 to 30% copper, 12 to 80% lead, 3 to 125 oz. silver and 80 cts to \$30 gold per ton, from azurite, chalcocite, chalcopyrite and galena. The reserves were estimated at 500,000 tons ore blocked out for stoping, which estimate is regarded as excessive.

The Purcell group of 16 claims, 3 fractional, 275 acres, shows 3 approximately parallel mineral zones, developed by a 96' shaft and a 200' tunnel, estimated by the company to give assays of 15% copper, 20 oz. silver and \$1.50 gold per ton.

The Bolello group of 9 claims, 180 acres, 2 miles S. of the Purcell, has basic granite, with frequent quartz-porphry intrusions, showing 3 copper veins, slightly developed, carrying ore that has given assays up to 24% copper, with gold and silver values.

The Black Dyke group of 48 claims, 960 acres, is W. of and about 3 miles N. from the Purcell group, constituting a parallelogram 3,600' wide and 12,000' long, showing strong iron outcrops, with favorable indications, having a number of shallow shafts, showing copper ore of 4 to 25% copper tenor, and silver-lead ore assaying up to 69% lead and 139 oz. silver per ton. This group has little development, but appears promising.

Equipment includes a 250-h. p. steam plant, burning petroleum, with 2 hoists, and there are 6 buildings, including 2 general stores.

The Old Pueblo Mining & Milling Co.'s property consists of 9 claims, 5 miles W. of Tucson, developed by the 517' Quien Sabe shaft and a tunnel. A 70' shaft cut, at depth of 30', a 15-ton pocket of chalcocite, assaying 33% copper, 16 oz. silver and \$2.50 gold per ton.

TULAROSA COPPER CO.

NEW MEXICO

Office: Tularosa, N. M. Mine office: Bent, Otero Co., N. M. F. P. Kern, pres.; John A. Thatcher, chairman; A. J. Merrill, Geo. B. Bent, secretaries; J. N. Beatty and P. M. Lynch, directors; W. Roland Cox, cons. engr.; Geo. F. Harley, gen. mgr. Organized March 5, 1905, under laws of New Mexico, as successor of Tularosa Mining & Milling Co., capitalization \$5,000,000, shares \$5 par; issued, \$3,125,000. Stock dealt in on New York curb.

Property, 307 acres, patented, at Bent, on the Tularosa river. Mine is 12 miles N. E. of Tularosa on the E. P. & S. W. R. R., about 100 miles N. E. of El Paso, Texas. The company also owns 670 acres, unpatented.

The property is underlaid by a flat sheet of diorite resting on quartzite and covered in general by the basal sandstone of the Red Beds of the region. This diorite outcrops at the Virginia mine, as the company's workings are called, and dips gently in every direction away from this point. The ore is found in the uppermost part of the diorite, which is much altered to a depth of 35 to 55' below its surface. This ore bed shows lenses of glance, 2 to 18" wide, running in all directions, which together with stringers and veinlets of ore, make a stockwerk proved to be ore-bearing over an area 200' wide and about 1,200' long. The altered rock between the lenses also carries disseminated copper glance and the ore as a whole averages 2½% copper. 30 to 55' below the diorite surface, the rock is fresh except along fractures; stringers of ore occur however at depths of several hundred feet. At the Virginia mine there is an open pit 60x120' across and 35' deep which is opened on the richest part of the deposit. The 1st level corresponds to the bottom of the pit, the 2nd level is 25' deeper. These work-

ings are said to block out 85,398 tons of ore in an area of 105x180', in extent. Twelve diamond-drill holes from 88 to 400' deep prospect the ground and the results form the basis for an estimate of 820,000 tons of indicated ore of an average value of 2¼% copper.

At the present time 3 churn drills are reported to be working on the property and one hole, 350' W. of any previous development, is said to show commercial ore at a depth of 83'. Management states that property will be drilled in 100' squares and the limits of the orebody fully determined.

Equipment includes a 12,000' power ditch with hydro-electric plant, consisting of Platt-Francis turbine, alternating-current generator and complete electrically-driven concentrating plant.

The mill, originally of 30 tons daily capacity, was entirely remodeled and enlarged to 400 tons capacity in 1912, new rolls, a hydraulic classifier, another Wilfley table and 5 No. 3 Deister slime tables being added under the supervision of Godfrey D. Doveton. It is said that about 7,000 tons of ore was run through the 30-ton experimental plant in the 4 years ending July 1, 1910, giving a return of 221,230 lbs. fine copper, a net return of almost exactly 1.5% copper. The mill put 15 into 1, giving concentrates said to average 37% in copper tenor, with about 1 oz. silver per unit of copper, but the figures indicate 25% copper tenor for concentrates, if made at the ratio named.

Compared with other deposits of similar character, this one is extremely small and the ore bed very thin, averaging perhaps 35', while the ore reserves cannot be considered large enough to be even compared with those of any of the copper porphyries. This, of course, means that the property does not warrant a large mill, and the handling of the great tonnages which alone make it possible to produce copper at a low cost.

There seems to be no reason why the orebody should not extend over a greater area, or another one be found, and the drilling campaign inaugurated by the company may result in such an extension being found. The new parties in control have had wide experience in mining and possess ample means to test the property thoroughly.

TULLOCH GOLD & COPPER CO.

NEW MEXICO

Office and mine: Silver City, Grant Co., N. M. D. H. Tulloch, president. Organized 1907. Lands, formerly 15 claims, 300 acres, apparently are now 1,200 acres, on Edith mountain in the White Signal district, said to show good ore near surface, and developed by 2 shallow shafts, 1 of 50', on the Dagger Point claim, showing ore claimed to average 14% copper. Property under option to the Mangas Development Co. but given up.

TUOLUMNE COPPER MINING CO.

MONTANA

Mine office: 16 West Granite St., Butte, Mont. Edw. Hickey, pres.; N. J. Bielenberg, vice-pres.; J. J. Harrington, sec.; R. J. Mac Donald, treas.; preceding officers, T. E. Murray, J. A. Clifford, Daniel Shields and M. E. O'Rourke, directors; A. E. Hobart, engr.

Organized June 4, 1906, under laws of Arizona, capitalization \$800,000, shares \$1 par. of which \$400,000 in stock was given for the property, and 210,000 shares were sold on the Butte market at par. Shares are listed on

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the New York curb, Boston, Spokane and Butte stock exchanges. Annual meeting, June 20. Dividends to date have been three, 15 cts. per share in 1911, none in 1912 and two 10 ct. dividends per share up to Aug., 1913. Owners of 321,055 shares waived their dividend rights Dec. 31, 1910, saving company \$144,429.

An audit of books by J. P. Callan, submitted Oct., 1913, shows balance sheet July 31, 1913, as follows: Assets—Mining claim, \$400,000; equipment, \$163,542; railroad spur, \$33,231; development, \$218,960; furniture, \$1,029; insurance prepaid, \$65; supplies, \$17,082; copper, gold, silver in transit, \$11,655; cash, \$36,713; miscellaneous, \$2,072. Liabilities—Capital stock, \$800,000; dividends unpaid, \$149; taxes, \$2,823; wages and accounts payable, \$13,709; surplus, \$67,669; total, \$884,352. Profit for period, \$572,029; five dividends, \$375,420. Profit and loss account shows mining expense, \$685,818; administration, \$89,846; agency maintenance, \$36,430; claims, \$900; Smoky Moke lode, \$432; profit, \$572,029. Credit, net return from ores, \$1,249,168; income from agency, \$50,000; income from investment, \$75,000; interests on deposits, \$11,378; total, \$1,647,371.

The auditor criticizes payment of \$36,117 for legal expense and \$89,846 for general office expense, June, 1908, to July, 31, 1913.

Property, 1 fractional claim 6 acres, lying between the Speculator and Jessie claims of the North Butte. The claim carries the Jessie and Edith May veins, parallel N. W.-S. E. fault veins with large ore shoots. The Jessie has stopes 25 to 50' wide of high-grade ore. The company had a suit with the North Butte, over the Jessie vein, the apex of which was found in the so-called compromise strip, lying between the Tuolumne and the Jessie claim of the North Butte, in which the North Butte held an undivided three-eighths interest. The litigation was settled amicably, Nov. 28, 1910, a decree of the court giving the Tuolumne the eastern 412' of the Jessie vein, below the 400' level and confirming the title of the North Butte to the Jessie vein in said 412' above the 400' level, and also confirmed the title of the North Butte to all of the Jessie vein lying W. of the 412' previously referred to, for a distance of about 1,100'. Development work seems to have established the fact that the apex of the North vein of the Tuolumne lies in the property of the Tuolumne Co., and that it unites with the Jessie vein near the 400' level of the Jessie shaft, and the Tuolumne was the prior location, hence the North Butte secured a very satisfactory settlement.

The Tuolumne is opened by a main shaft, 2,350' deep, Nov., 1913, which is to be sunk to 3,000', developing an orebody of 12 to 15' width, carrying high-grade ore ranging from 5 to 12% copper with an average of about 7%. The E. drift on the 2,200' level showed 10' of 4.6% ore carrying good silver values. The 2 other veins of the Tuolumne are of promise, 1 vein carrying about 25' of very low-grade copper ore on the 1,000' level and in Oct., 1913, a new orebody 12' wide, of $4\frac{1}{2}$ to 6% copper ore was cut on this vein on the 800' level.

Equipment includes a steam plant with six 150-h. p. Erie City boilers delivering steam at 150 lbs. pressure per sq. inch. There is a powerful Nordberg hoist, good for 3,000' depth, installed 1911, and a 20-drill Nordberg air compressor. The power house, covering boilers, hoist and compressor, is 40x100', of steel, sheathed with corrugated iron. Other buildings are a 70x80' carpenter shop, of wood and iron, a 16x24' smithy, and minor structures.

Ore, formerly shipped to the Butte Reduction Works, now goes to the Washoe Works, under contract. Production, Sept., 1909, to May 31, 1910, was 19,484 tons of ore, estimated to have averaged about 10% copper and 35 oz. silver per ton. Production was about 3,750,000 lbs. fine copper in

1910; 30,499 tons in 1911, yielding 4,261,705 lbs. copper, 6,373 oz. silver and 146 oz. gold. During 1912, company shipped 14,391 tons of 7.35% and 33,291 tons of 4.5% copper ore. The shipping ore carried 3.38 oz. silver and the concentrating ore $2\frac{1}{2}$ oz. silver per ton. Product for 1912 was 4,716,047 lbs. fine copper, 131,867 oz. silver and 259 oz. gold. Total production for the 5 years ending July 31, 1913, was 136,815 tons of ore of a gross value of \$1,857,346.

A proposition to merge with the Butte Main Range Copper Mining Co. and thereby to acquire 40 acres of desirable undeveloped ground on the E. side of the Butte district, was opposed by several stockholders and finally abandoned, Aug., 1913.

TUSAS PEAK GOLD & COPPER MINING CO. NEW MEXICO

Idle. Office: Portage, Wis. Mine and mill at Tusas, Rio Arriba Co., N. M. R. H. Owen, pres.; R. J. Rosenfeld, sec.-treas.; Col. F. Randall, supt. Organized April 28, 1902, under laws of New Mexico, capitalization \$2,000,000, shares \$1 par. Bonds, \$100,000 authorized; issued, \$16,000.

Lands, 13 claims, 230 acres, and a 5-acre mill site, in the Bromide district, 14 miles W. of Tres Piedras, and 10 miles from a railway. Principal development is on the Tampa mine, having a 13' vein of copper ore, with a 5' paystreak said to average 7.5% copper, balance of ore being of concentrating grade. The Tampa has shafts of 80', 85' and 425', with about one-half mile of workings, showing ore reported by company to assay 5 to 44% copper, 1 to 4.5 oz. silver and \$1.20 to \$3.80 gold per ton, with some ores assaying up to 2.3 oz. platinum per ton and carrying some molybdenum. The main shaft shows ore of good average tenor, but in small quantities, and the management believes that it will be necessary to sink to 500 or 1,000' depth in order to develop good orebodies.

Equipment includes a hoist and 3-drill air compressor, with a hydraulic dam on Tusas creek, sawmill and a 40-ton leaching plant, planned to treat oxidized ores, but not in operation. The mine and plant were shut down Jan. 1, 1910, and no work done since, but company expects to resume work shortly.

TUSCARORA MINING & MILLING CO. CALIFORNIA

Address: care Al. D. Myers, president, Los Angeles, Cal. Mine in the Monument Peak, or Whipple Mountain district, 12 miles N. of Parker, and 14 miles N. of Vidal, on the A. T. & S. F. R. R. Company is a reorganization of the Tuscarora Mining Co. Property shows pre-Cambrian schist and gneiss with veins from 2 to 5' wide, carrying chalcopryrite and glance ore with gold values. Development consists of 2 shafts on the same vein, 2,000' apart, opening ore to a depth of 300'. A "strike" of gold ore was reported, Feb. 1912.

TWIN BUTTES MINING & SMELTING CO. ARIZONA

Office: 314 Railway Exchange, Milwaukee, Wis. Mine office: Twin Buttes, Pima Co., Ariz. Michael Earls, pres.; W. A. Barber, vice-pres.; Edw. P. Hackett, treas.; preceding officers, Hon. David S. Rose, W. B. Hill, Howard Nunnemacher, Geo. P. Mayer, John G. Baxter and Jas. R. Ricketson, directors; Albert L. Waters, gen. mgr.; J. S. Brown, engr.; E. G. Bush, supt.

Organized Sept. 8, 1903, under laws of Arizona, capitalization \$1,000,000, increased, 1905, to \$1,250,000, and again increased, Jan., 1910, to \$2,000,000, shares \$1 par. Bonds outstanding were \$100,000, at last accounts. Controls the Twin Buttes Railroad Co., and it was said Feb., 1910, that the sale of part of the road would liquidate the company's indebtedness. Wisconsin Trust Co., transfer agent and registrar. Annual meeting, third Tuesday in January.

Property, the King and Glance mines with 61 claims, partly patented,

1,250 acres, in the foothills of the Sierrita mountains, in the Helvetia district. Lands are reported to carry fissure veins in limestone, and contact deposits having a limestone foot and granite-porphry hanging. The various properties of the company had about a mile of workings 1906, estimated to show 50,000 tons of ore blocked out for stoping, averaging 7% copper and 1.85 oz. silver, with traces of gold, which estimate was too high.

The Senator Morgan mine has a 7x16' three-compartment shaft, of about 500' depth, showing a vein of 25' estimated average width, carrying sulphide ore, estimated formerly to average 10% copper. The mine was being worked with 25 men in October, 1913.

The new Main shaft, 700' east of the Senator Morgan, was 700' deep, April, 1910, and has the equipment formerly at the Senator Morgan shaft, including a hoist and air compressor.

The Copper Glance mine has a 415' shaft, sunk on an orebody having a 30' gossan, succeeded by about 200' of carbonate ore, and on the 300' level a crosscut passed through 35' of marcasite carrying kidneys of chalcocite, and a crosscut on the 400' level encountered a promising ledge of soft leached ore.

The Copper King mine has a 200' shaft, showing carbonate ores in the upper workings and sulphides in the bottom. New orebodies are being developed on 2 last-named claims.

Equipment includes a 300-h. p. steam plant, burning wood and petroleum, with a 125-h. p. Leyner double-drum hoist, capable of raising 3-ton loads, and a 10-drill Leyner compound air compressor at the Main shaft. There is a gasoline plant at the Copper King mine. There are 14 dwellings, including the power house, machine shop, smithy and a general store.

The Twin Buttes railway, 25 miles in length, running from Twin Buttes to Tucson, completed 1906, has 1 locomotive and 3 flat cars. It was said Feb., 1910, that the company had agreed to sell 18 miles of its line to the Southern Pacific, for \$215,000, leaving 7 miles to the company.

Production was 700,329 lbs. fine copper and 11,294 oz. silver in 1906; 94,056 lbs. copper and 342 oz. silver in 1907; 963,000 lbs. copper and 6,745 oz. silver in 1908; 1,097,550 lbs. copper and 9,800 oz. silver in 1909; 258,672 lbs. copper and 3,446 oz. silver in 1910. Was shipping about 100 tons daily in 1912, to the Pioneer smelter, but under lease to E. G. Bush, Oct., 1913. Property considered promising, but handicapped by lack of adequate capital.

TWIN CITY MINING & MILLING CO.

MONTANA

Office and mine: Elliston, Powell Co., Mont. W. M. O'Connell, pres.; F. B. Hubbard, vice-pres.; E. J. P. Dwelly, sec.-treas.; preceding officers, P. H. McCauley, J. L. Hurd and John Churchill, directors. Allan McNaughton, gen. mgr. Organized in Montana, capitalization \$500,000, shares \$1 par; issued, 300,000, fully paid and nonassessable. Annual meeting, April 4.

Property, 5 claims, 70 acres, patented, in Elliston district, 8 miles from Elliston, on east side of Telegraph creek. Ore occurs in granite and management reports 6 veins, of which 1 is under development by 2 shafts, 170' and 50' deep, and a 250' tunnel with 3 crosscuts. Total workings 525', said to prove vein 25' wide, traceable for 3,000' and proven to 170' depth, carrying 5% copper, 4% lead, 19 oz. silver and \$3 gold per ton. Values said to increase in depth and sulphide ores expected at about 300'.

Equipment includes steam power, one 40-h. p. hoist and several buildings. Company plans installing steam hoisting plant, sinking shaft to 500' level and exploring generally.

TWIN-EDWARDS COPPER MINE CO.

NORTH CAROLINA

Office and mine: Greensboro, Guilford Co., N. C. Organized Sept., 1902,

capitalization \$100,000, shares \$100 par. Owns sundry old properties, including the Twin mine, with an 18' vein, which was worked previous to the American Civil War. Property shut down many years, but company understood to be only dormant, not dead.

TWIN METALS MINING CO.

NEVADA

Address: care Al. Price, pres., Reno, Nev. E. E. Granger, vice-pres.; August Frolich, treas. Property, the Emily May group of 3 claims, 5 miles N. of Reno, held under bond and lease. The claims, near the Summit switch of the N. C. O. R. R., have only been worked since Aug. 1, 1913. A 40' shaft shows a well-defined fissure vein, 5' wide, carrying a 20" paystreak running 42% copper and 44 oz. silver. The bond is for \$15,000 and shipments now being made will apply on purchase price.

TWO LAKES COPPER MINING CO., LTD.

ONTARIO

Idle. Office: Oil City, Pa. Mine office: Sowerby, Algoma, Ont. Dr. E. L. Dickey, pres.; S. F. Amsler, vice-pres.; D. G. Bailey, sec.; J. C. Wilkins, treas.; F. W. Bailey, gen. mgr; preceding officers, J. W. Russell, C. W. Coulter, G. W. Freeman and Edw. Schwabenbauer, directors; A. J. Drescher, engr. Organized Oct. 12, 1906, under laws of Ontario, capitalization \$500,000, shares \$1 par, nonassessable; issued, \$270,000. Annual meeting, first Tuesday in November.

Lands, 8 claims, 1 fractional, 300 acres, freehold, including the Robinson and Tupper mines, 8 miles from Thessalon, and 4 from a railway. The property shows pre-Cambrian rocks, slate, conglomerate and greenstone, carrying a number of fissure veins, of which 3, under development, are of 2 to 10' estimated average width, carrying sulphide ores of about 4.5% copper, with small quantities of silver and gold. Development is by shafts of 50', 25' and 10'.

Equipment includes a 60-h. p. boiler and 35-h. p. hoist. There are 8 small buildings. In 1913, the management plans further development, as soon as the financial situation improves.

TWO REPUBLICS MINING CO.

ARIZONA

Mine, 10 miles from Jerome, Yavapai Co., Ariz. R. A. Smith, pres.; John B. Lecorr, vice-pres.; Paul Smyly, sec.-treas.; A. T. Dixon, mgr., at last accounts. Organized 1908, under laws of Arizona, capitalization \$1,000,000, shares \$1 par. Lands, 16 claims, unpatented, developed by a 600' tunnel. No returns secured.

TYEE COPPER CO., LTD.

BRITISH COLUMBIA

Office: 45 Leadenhall St., London, E. C., Eng. E. V. Hearn, agent, Victoria Trust Bldg., Victoria, B. C. Works office: Wm. J. Watson, mgr., Ladysmith, Vancouver Island, B. C. Thos. Headland Wilson, chairman; Harry von Berg and H. Loeffler, directors. Wm. Gardner, sec. Organized April 4, 1900, under laws of Great Britain, capitalization £180,000, increased 1901, from £120,000, shares £1 par, fully issued and paid. Accounts for year ending April 30, 1912, show a debit balance of £97,166, being a slight increase. Reserve fund and investments are reported as £47,858; debtors, £4,000; cash, £204 and creditors, overdrafts and loans, £52,542. Dividends were 10%, or 2 shillings in 1904, 10% in 1905, 5% in 1906, 7½% in 1907, none since.

Property, 1,247 acres, including 13 claims, crown granted, 342 acres, a 45-acre smelter site and 800 acres timber lands. Company had option on the Big Strike group of claims, on Ship bay, near Valdez, Alaska, and also prospected for coal, with diamond drills, on islands adjacent to the E. coast of Vancouver Island.

The Tyee mine, on Mt. Sicker, in the Somenos district, 11 miles N. W. of Duncans, and about 80 miles from Victoria, yielded only 1,200 tons of

ore 1907, and has been idle since. The orebody was rich, but shallow, and although the vein was explored thoroughly, nothing of value was found.

Company has been looking for a new mine for several years. It had a bond and lease on the Cornell mine, J. W. Bryant, superintendent, at Van Anda, Texada island, B. C., and has examined various properties without finding one to its liking.

The smelter, known as the Lady'smith works, is well located, on a 45-acre site on Oyster harbor, and takes custom ores from as far N. as Alaska and as far S. as Mexico. The smelter was considerably improved, 1907-08, at a cost of £20,000, and was remodeled and practically rebuilt 1909-10. There is a 40x210' wharf, having an electric hoist, connected, by an elevated incline trestle, with the smelter bins, which are of 5,400 tons capacity. The works are terraced throughout, permitting handling of material by gravity, and have a capacity of 500 tons daily. The sampling mill is 29x34' on the ground, and 70' high.

The 56x81' wooden furnace building has 42x120" and 48x160" Allis-Chalmers blast furnaces, of 200 and 300 tons daily capacity respectively, only the larger furnace being in blast, the smaller being held as a spare. The furnaces use a hotblast, and have water-jacket forehearth, slags skimming into a settler, and thence into a launder, where granulated and sluiced out by running water to low ground in the bay for filling. The 8x11x165' dust flue leads to a 90' smokestack of 7' diameter. The furnaces reduce 9.45 tons of ore and flux with 1 ton of coke. Equipment also includes a briquetting plant for fines, apparently not in present use, and the matter of adding an electrolytic refinery has been considered. Furnace product is a 40% copper matte, shipped to American works for refining. Smelter closed down Dec., 1911, when converters were installed.

The smelter power plant uses electric current and includes 2 Connorsville blowers and an Ingersoll-Sergeant air compressor. Miscellaneous buildings at the smelter include a good laboratory, smithy and machine shop.

Smelter production was 3,604,474 lbs. copper in 1903; 5,045,000 lbs. in 1904; 3,039,398 lbs. copper, 103,474 oz. silver and 5,952 oz. gold in 1905; 3,173,431 lbs. copper in 1908; 2,148,058 lbs. copper in 1909; 45,758 tons of ore, yielding 3,392,901 lbs. copper, 41,128 oz. silver and 10,041 oz. gold in 1910. In 1911, 42,030 tons of custom ore were treated. The Red Cliff Mining Co., Ltd., is reported to have had an option on a controlling interest in the company, 1912. In 1913, the Tyee Co. made an ore-smelting contract with the Ptarmigan Mines, Ltd., for the ores from the Big Interior mine and Mr. H. H. Johnston was sent out as manager.

TYRONE COPPER CO.

NEW MEXICO

Properties at Tyrone, Grant Co., N. M., adjoining the Chemung group, are now owned by the Phelps, Dodge Co.

UBEHEBE COPPER MINES & SMELTER CO.

CALIFORNIA

Office: 1316 Continental Bldg., Baltimore, Md. Operating office: Tonopah, Nev. Mine office: Lone Pine, Inyo Co., Cal. John Salisbury, pres. and gen. mgr.; Henry G. Merry, vice-pres. and cons. engr.; J. J. Griffith, sec.-treas.; Raymond T. Baker, supt. Lands, 50 claims, 1,000 acres, in the Ubehebe district, 50 miles W. of Bonnie Clair station, on the Bullfrog & Goldfield railway. The property, said to show veins of 8 to 50' width, carrying gold and silver ore up to 20% in copper tenor, has an 80' shaft and a 145' tunnel, with some development on other holdings. The company has done annual assessment work but contemplates no further extensive development until the financial situation improves.

UINTAH MINING, MILLING & DEVELOPMENT CO.

UTAH

Office: 625 Kearns Bldg., Salt Lake City, Utah. Dr. J. A. Denike, pres.;

Dana T. Smith, sec. Owns the Castro group of mines, Bingham Canyon, Utah, formerly belonging to the Castro Grecian Co.

ULCAHOMO MINING & MILLING CO.

WYOMING

Idle. Office: 800 Custer St., Laramie, Wyo. Mine near Leslie, Albany Co., Wyo., J. S. Atherly, pres. and gen. mgr.; M. T. Ulen, vice-pres.; A. Carpenter, treas.; Mrs. A. Ulen, sec.; preceding officers, Hon. Leroy Grant, R. H. Scott and W. H. Crandall, directors. Organized 1904, under laws of Wyoming, capitalization \$1,000,000, shares \$1 par, nonassessable; issued, \$758,000.

Lands, 11 claims, freehold, 220 acres, 1 to 2 miles from the Strong Copper Mining Co., and 8 miles from the Union Pacific railway, in Natrona county, Wyo., showing gabbro, granite and schist with 4 fissure veins in granite, having a S.-E. strike, estimated by the management to average 23' in width, to carry cupriferous pyrite, and to average 6% copper, 2 oz. silver and \$3 to \$1,000 free gold per ton. Development is by 6 pits and shafts, of 10' to 105' depth.

Equipment includes a 40-h. p. steam plant with hoist and 3 buildings.

ULIDA CONSOLIDATED COPPER CO.

NEVADA

Organized, 1913, in Salt Lake City, Utah, to operate in Cocomunga district, Esmeralda Co., Nev. Is apparently no relation to company formerly owning mine of this name in Inyo county, Cal.

UNCLE JOE MINING CO.

UTAH

Office and mine: Goshen, Utah Co., Utah. Louis Weber, pres.; Wm. Weber, vice-pres.; Prof. J. H. Weber, sec.-treas. and gen. mgr. Organized under laws of Utah, capitalization \$10,000, shares 10 cts. par, nonassessable; issued, \$7,250, Dec., 1909.

Lands, 9 claims, unpatented, 180 acres, developed by a tunnel of 2,409', showing streaks of high-grade copper ore. The Copper Jack group of 10 claims, in the Erikson district of Tooele county, was explored, 1909-10, but apparently the bond thereon was surrendered. Equipment includes two 50-h. p. hoists, a 6-drill air compressor and a churn drill. No recent returns secured.

UNCLE SAM CONSOLIDATED MINING CO.

UTAH

Office: 516 Dooley Block, Salt Lake City, Utah. Mine office: Eureka, Juab Co., Utah. Hon. John Dern, pres.; M. P. Braffet, vice-pres.; Frank Kimball, treas.; Fred C. Dern, sec.; J. C. Dick, gen. mgr. and George Haverkamp, directors; C. C. Griggs, supt.; Geo. Castleton, assayer and A. E. Hadley, purch. agt.

Organized June 29, 1900, under laws of Utah, capitalization \$750,000, shares \$1 par, assessable; increased, Aug. 21, 1912, from \$500,000; issued, \$550,000, with 1 assessment levied. The company formerly owned a 50% stock interest, 400,000 shares, in the May Day Mining & Milling Co., which stock was distributed 1910, to shareholders, as a stock dividend. The Richmond & Anaconda Mining Co., adjoining, was absorbed 1912, by the Uncle Sam. Regular dividend rate was 2 cts. per share monthly, changed June, 1910, to 2 cts. quarterly, with an extra dividend of 3 cts., Dec., 1910, dividends for 1910 having been 19 cts. per share; total dividends to April, 1913, were \$470,000. Shares are listed on the Salt Lake exchange. Annual meeting, first Monday in June.

Lands, 4 claims, patented, in Tintic district, including the Humbug mine, which is the principal property, producing mainly auriferous silver-lead ore of both smelting and milling grades, but the mine has some cuprite and copper carbonates of 12 to 33% in copper tenor. A good orebody was developed, 1911, in the western part of the property. Equipment includes steam power and a concentrator.

Production, for fiscal years ending June 7, was 185 carloads of ore, giving net smelter returns of \$135,444.94, in 1908; 4,465 tons of ore, averaging \$29.26 per ton, giving net smelter returns of \$130,697.49, in 1909; ore giving net smelter returns of \$116,323.77, permitting dividends of \$45,000 in 1910.

UNCLE SAM COPPER CO.**ALASKA**

Former mine office: Ketchikan, Alaska. Lands, on Kasaan peninsula, 3 miles from the Hadley, show a 40' vein, traceable 1,200', carrying ariferous and argentiferous copper ore, of fair average tenor. Property has necessary mine buildings and a 1,150' tramway leading from the mine to a wharf on tidewater. Mine shut down in 1912.

UNCLE SAM MINE.**MONTANA**

Located near Wickes, in Boulder district, Jefferson Co., Mont. Is an old mine which produced some 12,000 tons of ore carrying from \$30 to \$90 per ton. Vein is near a contact of aplite and andesite, the latter metamorphosed by granitic intrusion. The old workings exposed an ore shoot 12' wide carrying galena and sphalerite with some tetrahedrite. Mine was being reopened in 1912 and a crosscut tunnel run to intersect the lode at about 175' depth.

UNEEDA MINING CO.**ARIZONA**

Office and mine: Globe, Gila Co., Ariz. Samuel Seelig, pres.; T. L. Cross, vice-pres.; C. W. Cross, sec.; preceding officers, J. F. Mayer, Eugene Barrows, G. W. Leonard, Wade Stowell and C. W. Cross, directors. Organized April, 1909, under laws of Arizona, capitalization \$1,000,000, shares \$1 par. Property, 18 claims, on the Troy road, Pinal mountains, 4½ miles S. W. of Globe, have a 140' shaft showing sulphide ore assaying 7.63% copper, 1 oz. silver and \$1.40 gold per ton. Was operated and shipped a small amount of ore, 1912.

UNIDA GOLD & COPPER MINING CO.**ARIZONA**

Idle. Office: 907 College Ave., Cleveland, Ohio. Mine office: Wickenburg, Maricopa Co., Ariz. Geo. Margaretic, pres. and gen. mgr.; J. F. Buchanan, sec. Lands, in the Black Rock district, formerly held by the Electra Mining & Milling Co., which claimed average assay values of \$27 per ton, have a 300' shaft and tunnels of 200' and 300', showing ore giving good assay values in gold and copper. Equipment includes gasoline power. Several carloads of good ore shipped, 1907. No recent returns secured.

UNION; COMPANIA MINERA LA.**MEXICO**

Presumably idle. Mine office: Viesca, Coahuila, Mex. Property includes El Esfuerzo, La Ampliacion de Providencia and other groups, producing mixed ores carrying mainly copper values.

UNION y CONSTANCIA; MINAS.**MEXICO**

Letters unclaimed at Inde, Durango, Mex. Reinaldo E. Avila, owner and manager. Mines, which include the Union, Constancia and Misma Matracal, were opened in the sixteenth century. Country rock is andesite, showing 9 veins, carrying chalcoppyrite, galena and sphalerite ores containing pyrite. Orebody averages 2 meters width and is opened by a shaft of 18m. and by tunnels of 70m. and 100m., developing first-grade ore averaging 43% lead, 100 oz. silver and 54 oz. gold per metric ton, and second-grade ore averaging 4% copper and 20 oz. silver per ton, latter showing a little native copper. Probably idle owing to revolution.

UNION COPPER CO.**ARIZONA**

Probably defunct. Letter unclaimed at Globe, Gila Co., Ariz. S. G. Reading, pres.; W. F. Anthony, vice-pres.; F. L. Toombs, sec.-treas.; H. F. Campbell, supt., at last accounts. Organized Oct. 31, 1906, under laws of Arizona, capitalization \$1,000,000. Lands include the Chapparal, Sieboth and Halliday groups, the Chapparal group, 13 claims, 2 miles N. W. of the

Gibson, and the Halliday group, 4 claims, lying between the Gibson and Central. Equipment includes a small steam plant.

UNION COPPER CO.

NEVADA

At Yerington, Nev. Title changed to Standard Copper Co., in 1912 (which see).

UNION COPPER LAND & MINING CO.

MICHIGAN

Office: 70 State St., Boston, Mass. Mine office: Houghton, Mich. Harry F. Fay, pres.; Harold H. Anthony, Ezra H. Baker, Samuel Carr, Albert B. Merrill and John G. Stone, directors. C. J. Morrissey, sec.-treas.

Organized 1863, and reincorporated 1893, under laws of Michigan. Capitalization \$2,500,000; issued, \$2,000,000; shares \$25 par, \$2.06 paid. Company paid a dividend of 50 cts. cash and one-eighth share of new stock per share, in 1899; \$2 per share in 1907 and 50 cts. in 1908. Cash balance, March 27, 1913, \$3,853. Old Colony Trust Co., Boston, registrar; American Trust Co., Boston, transfer agent. Stock listed on Boston Stock Exchange. Annual meeting, fourth Thursday in March.

Property, 5,323 acres of land, carrying both surface and mineral rights, and 1,043 acres additional of mineral rights only, comprising 200 different tracts on the Keweenaw copper belt in Keweenaw, Houghton, Ontonagon and Gogebic counties. Company is primarily a land-holding corporation, but has from time to time investigated various tracts to determine their mineral value. Much of the land is covered with timber, stated by company's president to be valued conservatively at \$125,000.

In the winter of 1910-11, exploratory work by diamond drill on Sec. 1, T. 56 N. and Sec. 36, T. 57 N., R. 33 W., lying W. of the Allouez mine, was done by the company. Eight holes were drilled to an average depth of about 1,000' cutting the Allouez conglomerate and the Quincy-Pewabic amygdaloid, as well as a number of other beds carrying indications of copper.

UNION COPPER MINE.

NORTH CAROLINA

Office: care Sig. H. Rosenblatt, 42 Broadway, New York. Mine address: Gold Hill, Rowan Co., N. C.

Lands, 1,150 acres, freehold, about 15 miles from Salisbury, in Rowan and Cabarrus counties, well watered and timbered. The property has schists, carrying 5 veins with average strike of N. 20° E. and practically vertical dip, of 2 to 20' width, 3 of which carry copper ores, the other 2, reported to carry silver and gold ores respectively, being but slightly developed. The copper veins are mineralized zones carrying lenticular shoots of ore, longest about 100' in length. The principal development is on the Big Cut copper vein, trenched at intervals for a distance of about 1 mile, and having 10 shafts, of 150', 225', 650', 400', 200', 300', 200', 400', 165' and 200', the deepest shaft of 650', formerly claimed to be 900' in depth and these shafts were claimed to show a vein of 20 to 40' width, but actual maximum width is about 20' only. The Big Cut vein shows oxidized ores and a little native copper in the upper workings, succeeded by chalcopryrite, with quartz gangue. A careful sampling by Dr. A. R. Ledoux gave averages of 4.4% copper, 4 oz. silver and 40 cts. to \$1.20 gold per ton, and this apparently was from ore produced, and not a sampling of the mine itself, which was claimed, Oct. 26, 1908, by Alex. H. Low, assistant to the president, who was then Calvin H. Allen, to average only 3% copper, 2 oz. silver and 50 cts. gold per ton. No. 7 shaft, of 200' depth, shows a vein 4" wide at surface and 3 to 4' wide on the bottom level, where the ore is claimed to average 4.5% copper. There are 14 shafts all told, and the mine has about 5,000' of workings. The property has been claimed, in the press, to have produced about \$1,000,000 worth of gold in early days.

The machinery plant is extensive, but archaic, formerly including 27 boilers, 18 hoists and 3 air compressors, replaced by a new Ingersoll-Rand air compressor. There is a small electric light plant.

Buildings include a machine shop, smithy, engine house, boiler houses, foundry, office building, 50-room hotel, 130 dwellings and a stable for 400 horses and mules.

UNION COPPER MINES CO.

NORTH CAROLINA

Bankrupt. Office: 18 Broadway, New York. Mine office was Gold Hill, Rowan Co., N. C. Louis M. Ogden, pres.; Jos. Swift, vice-pres.; Woodruff Leeming, sec.-treas.; preceding officers, Alex. Konta, Erastus M. Cravath, Douglass Green, Chas. A. Heckscher, Samuel H. Lever and Edw. H. Swan, directors, at last accounts.

Organized May, 1907, under laws of Maine, as a reconstruction of the bankrupt Union Copper Mining Co., which in turn was a reconstruction of the Union Copper Co., shareholders exchanging 2 old shares for 1 new share. Capitalization \$2,500,000, shares \$5 par, nonassessable; fully issued.

Lands, 1,150, about 15 miles from Salisbury, in Rowan and Cabarrus counties, were sold at sheriff's sale July 7, 1913, to the Security Transfer & Registrar Co., for \$7,100, in satisfaction of a judgment obtained against the company for labor and wages due. An effort to save the property by having shareholders contribute 10 cts. per share was made May, 1913, but met with no response. Shares worthless. Fully described Vol. X.

UNION MINE.

MICHIGAN

Idle. Property, originally held by the Isle Royale & Lake Superior Co., was the first mine opened in the Porcupine mountains, Oct., 1864. The mine has 4 shafts of 85 to 400' depth, with 4 levels opened on an amygdaloidal bed lying N. of the Nonesuch lode, and once had a small stamp mill with Frue vanners. Was optioned and unwatered, 1908, by the Calumet & Hecla Mining Co., but relinquished.

UNION MINES CO.

ARIZONA

Hoval A. Smith, owner, Bisbee, Ariz. Holds an undivided interest of about 50% in the Arizona King, or Copper King mine, at Bisbee, described under title of Copper King mine.

UNITED ARIZONA COPPER CO.

ARIZONA

Probably dead. Mine office: Prescott, Yavapai Co., Ariz. Lands, known as the Mahoney group, in the Black Rock district, are said to show a vein of 5 to 50' width, opened by a 100' shaft, and about 1,000' of workings, showing ore assaying well in copper, silver and gold.

UNITED ARIZONA COPPER CO., LTD.

ARIZONA

Idle. Office: 1 Broad Street Ave., London, E. C., Eng. Mine office: Vekol, Pinal Co., Ariz. Rt. Hon. Earl of Orford, chairman; Horace J. Nevill, vice-chairman; preceding and Thos. Syminton, directors; Jas. Francis Shearer, sec.; Van H. Brooks, mine mgr. Organized Oct. 15, 1902, under laws of Great Britain, capitalization £200,000, shares £1 par; issued, £160,000, fully paid. Has an indebtedness of £30,000, not bearing interest.

Lands, 500 acres, known as the Reward mine, 6 miles from Vekol, bought Oct. 15, 1902, of the Reward Consolidated Copper Mining Co., for £160,000. Property includes a 30-ton smelter, of small present value. Lands were bonded 1907, for 30 months, to the Casa Grande Development Co., which was succeeded by the Savanna Copper Co., but the bond was forfeited, 1910. Property is supposed to contain a deposit of disseminated ore, besides veins, but needs further prospecting to develop tonnage. Negotiations for sale were in progress, 1913.

UNITED COPPER CO.

UNITED STATES

Office: care Hudson Trust Co., Hoboken, New Jersey. L. A. Dunham,

pres.; Chas. W. Saacke, sec.-treas., 74 Broadway, New York. W. C. Shaw, Geo. Lane, Bernard C. Hughes, G. Kuehne, Jr., J. B. Coates, directors. Receivers, John S. Sheppard, Jr. and Addison E. Cudworth.

The entire assets of the company were taken over by the Assets Realization Co., in 1913, for an overdue loan of \$1,000,000. Late in Nov., 1913, negotiations were in progress for the sale of these securities. The Assets Realization Co. claims \$1,800,000 additional for the La France Copper Co's bonds and unpaid coupons guaranteed by the United Copper Co.

Organized April 28, 1902, under laws of New Jersey, with capitalization \$80,000,000, shares \$100 par, in \$5,000,000 preferred 6% cumulative stock, and \$75,000,000 common stock; issued, \$50,000,000, in \$5,000,000 preferred and \$45,000,000 common shares, at last accounts. Stock is listed on the Boston and Pittsburgh Stock Exchanges. Metropolitan Trust Co., New York, Old Colony Trust Co., Boston, and Fidelity Title & Trust Co., Pittsburgh, registrars. American Trust Co., Boston, Union Trust Co., Pittsburgh, and C. S. Buckingham, New York, transfer agents.

The company has paid \$7,462,500 dividends, of which \$1,500,000 was paid on preferred and \$5,962,500 was paid on common shares, preferred dividends being \$150,000 in 1902, \$300,000 each in 1903, 1904, 1905 and 1906, and \$150,000 in 1907. The first dividend on common shares was paid 1905. Dividends on common shares were \$450,000 in 1905, \$3,150,000 in 1906, and \$2,362,500 in 1907. The common stock was placed 1906, on a "quarterly" dividend basis, at rate of 7% per annum, but the company maintained this rate for only a short time, suspending the dividends 1907.

For fiscal years ending June 1, the company's statements show income as follows: \$1,045,475 in 1904, \$1,513,850 in 1905, \$3,011,620 in 1906, \$861,023.97 in 1908, of which \$841,662.50 was from dividends on securities held, and \$19,361.47 from interest. Former president, F. Augustus Heinze, informed shareholders June, 1908, that the floating indebtedness of the company did not exceed \$1,100,000, but the company reported a surplus of only \$13,000, May 31, 1908.

The United Copper Co. is a securities-holding corporation solely, and was organized, ostensibly, along much the same lines as its former rival, the Amalgamated Copper Co., except that the Amalgamated buys control of subsidiary corporations to retain and operate, while the United operated as a blind pool, under the personal direction of the president.

The status of the company was changed materially 1906, with the settlement of the protracted litigation between this company and the Amalgamated, through the sale of its holdings in Butte to the Butte Coalition Mining Co., for which it is said to have received \$14,000,000 in cash and shares.

The chief subsidiaries and assets of the company have not been definitely reported, but are understood to include substantially all of the \$2,020,825 outstanding stock of the Montana Ore Purchasing Co.; the Basin Reduction Co.; the La France Copper Co., now defunct and without property; the Ohio Copper Co.; two-thirds of the capital stock of the Pittsburgh & New York Coal Co. and a mortgage of \$600,000 thereon, held by the Montana Ore Purchasing Co., owning about 9,300 acres of coal lands in Washington county, Pa., said to be worth \$18,000,000 and conservatively valued at \$4,000,000; an interest held jointly with the Canadian Pacific railway in 543,000 acres of agricultural and timber lands, valued at \$2 to \$3 per acre in southern British Columbia; 10,000 acres of timber land near Garrison, Mont.; the Danielsville gold mine, 13 claims, valued at \$100,000; a 60% interest in the Rimini Gold Dike, a porphyry gold mine, 400 acres, and the Katy and other mines at Basin, Mont.

The company also held \$75,000 first-mortgage bonds of the Ohio Cop-

per Co., \$62,000 bonds of the Western Ice Co. and is said to own 400,000 shares controlling the Stewart Mining Co., 100,000 shares and a block of bonds of the Ohio Copper Co., with smaller share interests in the Alice Gold Mining Co., the Western Utah Copper Co., Basis & Bay State Mining Co., Davis-Daly Copper Co.; Copper Securities Co., Bingham Mines Co., Bank of Discount, Fidelity Development Co., Consolidated Steamship Co., Balanced Cable Crane Co., Opex Consolidated Mining Co. and 1,200 shares Anaconda Copper Mining Co.

The petition in bankruptcy, filed by the Aetna Indemnity Co., stated that the United Copper Co. had less than \$1,000 in its treasury with total liabilities of nearly \$4,500,000, of which \$2,081,734 was past due. According to the Boston News Bureau "the Aetna Indemnity Co., was a creditor to the extent of \$10,000, through ownership of coupons from bonds of the La France Copper Co., guaranteed by the United Copper Co.

"The United Copper Co., which is largely a holding company, has made large advances to its various subsidiaries, amounting in all to \$2,591,000, according to the petition for receivership. In detail these advances are as follows: \$675,063 due from La France Copper Co. on advances; \$196,110 due from La France Copper on coupon guarantee; \$63,354 due from Pittsburgh & New York Coal Co. advances; \$212,959 due from Basin Reduction Co. on advances; \$1,244,143 due from Montana Ore Purchasing Co. on advances; \$200,000 due from miscellaneous; total, \$2,591,629.

"United Copper Co. assumed a liability of \$2,880,000 when it guaranteed La France Copper Co. bond coupons, of which \$460,000 are past due. There are unsecured debts of \$21,734, while secured claims approximate \$1,600,000. This amount is understood to be owed the Assets Realization Co., which has held the United Co.'s assets for some time past as security for loans.

"It is understood that United at one time held 20,000 shares of United Cobalt Exploration Co., 2,000 shares of Consolidated Steamship, several thousand shares of Western Ice and \$73,000 of its bonds, while the holdings in Stewart, Ohio and Davis-Daly were each in excess of \$100,000 shares.

"That the United Copper Co. operation was not limited to mining properties is apparent, for the Bank of Discount later became the Northern Bank of New York, which went down in the Robin failure; the Fidelity Development Co. was a land sales concern, which was supposed to control the Morris Park race track, while the Crane Co. owned a patent crane that was used to some extent during the construction of New York's first subway."

Receivers having been appointed by the United States Court, Feb. 15, 1913, and the receivership extended to include the Montana Ore Purchasing Co. in March, a protective committee of preferred stockholders was formed. This committee consisting of Dudley Olcott, chairman; E. T. Rice, J. T. West, with L. K. Thorn, secretary and Huntington, Rhinelanders & Seymour, of 54 William St., New York, as counsel, asked stockholders to deposit their holdings with the Old Colony Trust Co. of Boston or the Central Trust Co. of New York, for the purpose of reorganization. The deposit agreement provides that the committee have full power to act for the benefit of the depositing stockholders, and the agreement is binding until April 1, 1914, unless terminated by the committee. The time for deposit, originally April 13, was extended to May 15, 1913. To June 13, 1913, there had been deposited with the committee over 37,500 shares of preferred stock. An assessment of 30 cts. for each share deposited was ordered by the committee.

As the United Copper Securities Co. is the holder of much preferred stock under agreement of Dec. 18, 1911, whereby holders of preferred stock

of the United Copper Co. were offered \$15 per share, in collateral trust notes of the Securities Co., the latter company is an important factor in the re-organization.

UNITED COPPER-GOLD MINES CO.

OREGON

Office: Murphy Blk., Salem, Ore. Mine at Selma, Josephine Co., Ore. W. S. Low, pres. and gen. mgr.; C. E. Lebold, vice-pres.; Daniel Webster, sec.; James Greig, treas.; preceding officers, F. E. Newberry, E. O. Rice and J. A. Sellwood, directors. Capitalization \$500,000, shares \$1 par; issued 219,654. Annual meeting, first Monday in August.

Property, on Pickett creek, near Merlin, has been sold and company now owns 11 claims, in Illinois district, Ore., about 12 miles N. W. of Selma. Ore occurs, in serpentine near porphyry and diorite contacts. A dark gossan sometimes stained with copper is underlain at 15' depth by ore carrying 18% copper and 5 to 10 oz. silver and upwards of \$1 gold, according to management.

Development amounts to 1,000' with a 500' tunnel and 200' crosscut, exposing 1,000 tons of ore. Property is 34 miles from S. P. R. R. Is regarded as a prospect which will be worked on a large scale when railroad transportation is nearer.

UNITED COPPER MINING CO.

WASHINGTON

Office: 417 Hutton Bldg., Spokane, Wash. Mine office: Chewelah, Stevens Co., Wash. Conrad Wolfe, pres. and gen. mgr.; W. G. Collins, vice-pres.; M. E. Poole, sec.; S. Rosenhaupt, treas.; preceding officers, Daniel Hoch, J. H. Griffith, directors; R. H. Hewer, supt. Organized 1906, under laws of Washington, capitalization \$1,000,000, shares \$1 par, fully issued. Assessments to date, \$10,000. Bonds, \$20,000, authorized. Dividends, \$40,000 to end of 1912. Annual meeting, Jan. 28.

Lands, 8 claims, 4 fractional, patented, 123 acres, and 320 acres miscellaneous lands, 6 miles N. E. of Chewelah, the nearest rail point. The property shows shale and schist, carrying an orebody of 6' estimated average width, traceable 450', carrying malachite, chalcopryrite and tetrahedrite, reported by the company to have been proven to average 2.9% copper, 6 oz. silver and 40 cts. gold per ton. Ore is mainly chalcopryrite, with streaks of gray copper ore on both walls, latter carrying up to 24% copper, 400 oz. silver and \$2 gold per ton.

Development is by shafts of 600', 175' and 275', and a 1,700' tunnel on the 400' level, of which the first 735' is a crosscut and balance a drift, with a 2,700' lower tunnel, on the 1,000' level, planned to be driven 5,000' to gain a back of 1,100'. The mine has about 8,000' of workings, estimated to show 150,000 tons of ore, of about \$15 gross value, per ton.

Equipment includes a 200-h. p. steam plant, with 2 hoists, 4-drill and 6-drill Franklin air compressors, 11 power drills, 2 pumps, an electric light plant, and a 125-ton concentrator, operated by electrical power obtained from the Meyers Falls Power & Light Co. There are several mine buildings, including a 15x24' frame machine shop.

UNITED COPPER SECURITIES CO.

NEW YORK

Office: 42 Broadway, New York. Calvin O. Geer, president. Organized about Dec., 1911, for the purpose of giving the shareholders of United Copper Co. an opportunity to co-operate for the protection of their rights and property. Capitalization \$4,000,000; \$2,000,000 6% cumulative preferred, \$2,000,000 common. Company authorized \$2,500,000 6% 10-year collateral trust notes, and company offered holders of preferred stock of the United Copper Co. \$15 per share in company's trust notes, with proviso same cannot be sold below \$25 per share, and that a note holder shall receive one-half of any excess over \$15 per share realized upon the sale of his stock.

In lieu of this agreement the depositing stockholder may accept for each share United Copper preferred, \$10 in Securities Co.'s preferred stock in addition to the \$15 note, waiving further claim save as collateral security for note.

Holders of common stock of United Copper Co. were offered \$3 per share in trust notes with proviso of sale at \$10 per share, note holder to receive one-half of any excess over \$3 per share on the sale of the stock. In lieu of this, he may accept \$3.50 per share in preferred stock of Securities Co. in addition to the \$3 paid by note. All stock deposited is to be held as collateral security, against notes issued.

Assets apparently consist solely of a \$30,000,000 "damage" suit brought early 1913, against the Amalgamated Copper Co. and its subsidiaries.

UNITED ELY COPPER CO.

NEVADA

Mine address: Ely, Nev. G. L. Rickard, president and general manager, at last accounts. Organized Oct. 22, 1906, under laws of Nevada, capitalization \$5,000,000, shares \$5 par. Lands, 8 claims, slightly developed by churn drilling. Inactive.

UNITED EMPIRE CO., LTD.

BRITISH COLUMBIA

Office and mine: Princeton, Yale district, B. C. Wm. C. McDougall, pres. and gen. mgr.; John M. Smith, sec.-treas.; preceding officers, Mrs. M. L. McDougall, John M. Murray and R. L. Reid, K. C., directors. Organized Dec., 1906, under laws of British Columbia, as successor of United Empire Co., capitalization \$500,000, shares \$1 par; issued \$300,000.

Lands, 9 claims, 250 acres, 692 acres of crown-granted coal lands and 2,500 acres miscellaneous lands, in the Similkameen district. The copper lands show limestone, diorite and sandstone, with 2 orebodies, the one under development estimated to be 100' wide and to be traceable 4,500'. The ore shows malachite and occasional azurite, with chalcopyrite at depth, and is estimated to average 2% copper, 2 to 4 oz. silver and \$1 to \$2 gold per ton. Development is by shafts of 30' and 50', and by tunnels of 125', 225' and 80'. Adjoining the copper ore, on the western boundary, is a series of workable coal measures. Inactive.

UNITED GLOBE MINES.

ARIZONA

Office: 99 John St., New York. Mine office: Globe, Gila Co., Ariz. Jas. Douglas, pres.; A. C. James, vice-pres.; Geo. Notman, sec.-treas. Capitalization \$2,300,000, shares \$100 par. Is controlled, through ownership of entire stock issue, by the Old Dominion Co. For 1912, income was \$1,319,451 from ore and limestone, with expenses of \$699,975, giving net income of \$619,475, with a total surplus of \$580,781 Dec. 31, 1912. Paid dividends of \$6.50 in 1905, \$6 in 1906, \$4 in 1907, \$20 in 1912 and \$22.50 to Oct 1, 1913.

Lands, 29 claims and 3 mill sites, lying W. of the Old Dominion group, including the Grey, Buckeye and Buffalo mines. The mine is developed by 5 shafts and through the workings of the Old Dominion, of which this mine is practically a part, carrying the main vein of the Old Dominion in which the greater part of the development work is centered. The Maggie, Josh Billings and Grey No. 3 veins show low-grade sulphide ore. The Buckeye mine shows a little high-grade oxide ore on the 2nd level, and recent development work in the Buffalo mine has opened considerable ore, carrying good values in gold and silver.

Good productive ground is opened on the 800', 1,000', 1,200', 1,400' and 1,600' levels in the Old Dominion vein. The orebodies are extensive, but erratic, and the ores are decidedly silicious, but are in good demand at the smelting works of the southwest for converter charging. Practically all of the ore is treated in the Old Dominion smelter. An enormous tonnage of concentrating ore, of 3 to 4% copper, has been developed, as well as large

quantities of high-grade smelting ore up to 10% in copper tenor. An underground haulage line has been installed on the 14th level E. drift from "A" shaft of the Old Dominion mine.

Production was 4,607,537 lbs. fine copper and 5,277 oz. silver in 1906; 3,399,084 lbs. copper and 12,382 oz. silver in 1907; 2,599,155 lbs. copper, 29,308 oz. silver and 17 oz. gold in 1908; 3,674,728 lbs. copper, 43,486 oz. silver and 33 oz. gold in 1909, and 12,252,073 lbs. copper, 124,361 oz. silver and 789 oz. gold in 1912. (See Old Dominion Co.)

UNITED GOLD & COPPER MINING CO.

ARIZONA

Letter unclaimed at former office, Prescott, Ariz. J. B. Tomlinson, managing director. Lands, 7 claims, patented, well timbered, carrying water rights on the Hassayampa river, 10 miles south of Prescott. The property shows a vein of 4 to 5' width, carrying values mainly in gold, developed by the 300' Gold Bug shaft, and a tunnel on the American Eagle claim. There is a 20-stamp mill. Inactive.

UNITED GREENWATER COPPER CO.

CALIFORNIA

Office: Tonopah, Nev. Mine office: Dale, via Amboy, San Bernardino Co., Cal. John McGee, superintendent. Originally owned sundry claims in Inyo county, which apparently have been abandoned, and the company is now operating under bond and lease on the Seal of Gold group of gold quartz mines in the Dale district. This group embraces 50 claims and is developed by shafts of 700' and 1,000'. A 50-ton cyanide plant is being installed.

UNITED METALS CO.

ALASKA

Is owned by the Alaska Metals Co. Property is the Corbin mine, near Coppermount.

UNITED METALS SELLING CO.

NEW YORK

Office: 42 Broadway, New York. John D. Ryan, pres.; T. Wolfson, vice-pres.; R. M. Stuart-Wortley, Wm. Rockefeller, H. H. Rogers and J. W. Allen, directors. A. W. Evarts, sec.; C. W. Welch, treas.; C. S. Henry & Co., 12 Leadenhall St., London, E. C., Eng., European agts.

Organized Jan. 29, 1900, under laws of New Jersey, capitalization \$5,000,000, shares \$100 par. Is controlled by the Amalgamated Copper Co., through ownership of entire share capital.

The company does a general commission business in metals, mainly in copper, and is the largest copper broker in the world, being the sales agent for the Amalgamated Copper Co., and affiliated corporations, and for a number of other producers, having the marketing of upwards of 400,000,000 lbs. of copper yearly. A considerable part of the company's former profits were derived from the Raritan refinery, sold 1909, to the International Smelting & Refining Co., which was fully described under title of this company, Vol. VIII. For dividend record, see Vol. X.

UNITED MEXICAN MINES.

MEXICO

Office: Kansas City, Mo. Mine office: Cumpas, Sonora, Mex. O. L. Neer, manager. Lands, 40 miles S. of Nacozari, include the Veta Grande and Cerro Gordo groups, near the Transvaal mine.

Property shows rhyolite, granite and porphyry, with several orebodies occurring in fissure veins, and as breccia deposits between trachite and granite. Ores are principally auriferous and argentiferous copper sulphides, and as mined and smelted give returns of about \$300 per ton.

Equipment includes a small smelter. Company is presumably controlled by La Exposicion Mining Co. Is not favorably regarded.

UNITED MINING CO.

NEVADA

Mine office: Carson City, Nev. H. D. Cowden, pres. and gen. mgr.; R. H. Hingston, treas. and gen. supt.; F. W. Boston, sec. Organized 1905,

under laws of Nevada, capitalization \$3,000,000, shares \$1 par, nonassessable; 500,000 preferred and 2,500,000 common; issued \$1,876,150.

Property, 34 claims, 680 acres, in the Delaware district, 12 miles from Carson City. Country rock is granite, cutting sedimentary and intrusive rocks. Claims show 4 fissure veins in andesite and porphyry, capped by a strong iron gossan up to 200' in width. The limestone is highly crystallized and intruded by porphyry dikes. Ores developed are azurite and malachite with some copper oxides and silicates succeeded by sulphide ore at a shallow depth.

Development is, by shafts of 100' and 315', numerous test pits and prospect tunnels. The veins vary greatly in width, the principal orebody being 7 to 12' wide, so far as developed.

Equipment includes a 25-h. p. gasoline hoist, a 90-h. p. gas engine with air compressor of 5 drills capacity and a sinking pump, with about 8 buildings.

UNITED MINING & HOLDING CO. COLORADO & NEW MEXICO

Presumably idle. Letters unclaimed at former offices: 65 Journal Bldg., Boston, Mass., and Estey, Socorro Co., N. M., and White Pine, Gunnison Co., Colo. Geo. H. Cragin, pres.; Benj. F. Coburn, sec.-treas. and gen. mgr., at last accounts. Company was promoted apparently as successor of the Dividend Mining & Milling Co. There is said to be an issue of \$75,000 first-mortgage bonds, on the New Mexico property.

Lands, 9 claims, patented, 55 acres, known as the Morning Glim or Spar group, formerly held by the Spar Copper Mines & Tunnel Co., on Contact mountain, in the Tomichi district, Colo., said to have been bought for \$60,000 from the estate of Chas. L. Tutt. The Spar group, developed by tunnel, has about 2,200' of workings and is claimed to have produced upwards of \$75,000 worth of ore in the past. The Spar group has a small gasoline plant.

UNITED M., M. & COPPER SM. CO. MARYLAND & PENNSYLVANIA

Office: Frederick, Md. Mines at New London, Md., and Charmian, Pa. Thos. A. Dunshee, gen. mgr.; Henry Johnson, supt. Organized 1913, under laws of New Jersey, capitalization \$2,000,000, as a merger of the Eagle Metallic Copper Co. and the Linganore Copper Co.

Lands, 806 acres, in 2 groups, include the Dolly Hyde, New London and Eagle mines, on the Western Maryland and Baltimore & Ohio railroads.

The Dolly Hyde mine, 220 acres, was for many years the principal copper property of Maryland, though never a large producer. The mine has contact deposits in dolomite and phyllite, carrying a little malachite in the upper workings, succeeded at shallow depth by bornite and chalcopyrite in white marble. This mine is idle, but was being prepared for production, late 1913.

The New London or Linganore mine, 86 acres, with 14 acres of timber land, was opened and worked 1835-55, apparently at a profit, and was idle after 1881, until reopened, May, 1907, but is again idle. The property has two 4 to 5' fissure veins in slate, with N.-E. strike, carrying bornite and gray copper, estimated to average 3% copper and 16 oz. silver per ton, with a trace of gold. Development is by a 250' shaft, planned to be deepened to 500', and 4 tunnels, longest 340', with a total of 1,095' of workings, estimated to block out 17,307 tons of ore for stoping.

The New London mine has a 65-h. p. steam plant, with a 35-h. p. hoist, good for 500' depth, and an 8-drill Sullivan air compressor. There are 12 buildings, including a 24x36' machine shop, 20x24' smithy, 20x28' carpenter shop, office, engine house, saw mill and 6 dwellings.

The mill is 44x54' with a 26x76' concentrating room, equipped with a 125-h. p. steam plant, 15x30" Cresson crusher, of 100 tons daily capacity, 4 sets of rolls, 1 Richards jig, 5 James tables, 5 trommels, screens, settling tanks, etc. This mill proving inadequate, a new plant 40x25' in size, consisting of a ball mill and slime tables, was installed 1911, to treat the fines of the older mill.

The Eagle mine comprises 500 acres near Charmian, including an old copper mine, never successfully worked. Property shows a mineralized zone of 400' average width, carrying native copper, chalcocite, bornite, chalcopyrite and tetrahedrite, averaging about 2 oz. silver per ton, with traces of gold. Mine has a 480' shaft at 40° incline, in ore from surface, giving assays up to 6% copper, but is worked opencast.

Equipment includes a 175-ton smelter and 150-h. p. steam plant.

UNITED SMELTERS, RAILWAY & COPPER CO. WYOMING

Office: Cleveland, Ohio. Mine office: Rudefeha, Carbon Co., Wyo. Works office: Encampment, Carbon Co., Wyo. Isaac N. Pennock, pres. and receiver; J. E. Haskell, vice-pres.; Willard Pennock, treas.; preceding officers, Warner Moore, A. L. Hawse, W. E. White, Eugene M. Cobb, F. A. Baldwin and Andrew S. Upson, directors, at last accounts. Organized Feb. 10, 1909, under laws of Wyoming, capitalization \$12,500,000, shares \$10 par, nonassessable, in \$2,500,000 noncumulative 7% preferred stock and \$10,000,000 common stock; issued \$8,190,000, at last accounts. Bonds, \$2,500,000 authorized, at 6%, for 20 years; issued \$2,100,000, of which apparently \$1,600,000 remain outstanding. This bond issue was put out Jan. 1, 1909, by the Penn-Wyoming Copper Co. The preferred stock was provided, ostensibly for the purpose of taking up the bond issue at any time during the life of the bonds, or at the option of the bondholders. On Nov. 5, 1909, the United Smelters, Railway & Copper Co. was claimed to hold more than 91% of the outstanding stock of the Penn-Wyoming Copper Co. Cleveland Trust Co., registrar.

The property claimed by this company is described under the title of the Penn-Wyoming Copper Co., which apparently was the legal owner, and full particulars regarding the entire chain of promotions, including this company, are given in Vol. X, under Penn-Wyoming Copper Co. This company was claimed, March, 1909, to have a working capital of \$250,000 in its treasury, but went into bankruptcy later. President Pennock sent out notice of what was practically a 5% assessment, June, 1910, ostensibly to protect the property from foreclosure by bondholders, and an attempt to foreclose was made by the bondholders, who apparently are mainly insiders of this corporation.

UNITED SMELTING & REFINING CO. MONTANA

Is controlled through stock ownership by the American Smelting & Refining Co. Property, the East Helena and the Great Falls smelters, Mont., the latter idle for many years.

UNITED STATES COPPER CO. NEW MEXICO

Office and mine: Hanover, Grant Co., N. M. J. W. McAlpine, pres., treas. and gen. mgr.; John Orelbeke, first vice-pres.; F. C. Bell, second vice-pres. and supt.; N. A. Karsten, sec.; J. T. James, cons. engr.; Vere Leasure, chemist-assayer. Organized May 1, 1911, under laws of New Mexico, as a reconstruction of the Philadelphia Copper Mines Co., capitalization \$500,000, shares \$1 par, nonassessable; issued \$185,000.

Lands, 5 claims, 3 fractional, surveyed for patent, about 60 acres, partly timbered, in the Central district, near Hanover, showing a contact vein between limestone and granite-porphry, with a strike of N. 36° E., and practically vertical dip. The ore estimated by the management at 150'

width, carries chalcopryite, with some bornite and occasional chalcocite, said to average 6% copper, 4 oz. silver and \$3 gold per ton. Selected surface ores have given assays of about 2% copper, 2 oz. silver and \$28.50 gold per ton. The mine, opened 1881, shipped some good ore, and is said to have paid its way in the past, under various ownerships. Development is by trenches and shafts of 180', 265', 65' and 35', with tunnels of 210', 480' and 60', all in ore. There are 1,655' of workings, estimated by the management to show 5,000 tons of ore blocked out for stoping.

Equipment includes a steam plant with two 100-h. p. Freeman tubular boilers, 2 hoists, and a 10-drill Ingersoll-Rand No. 10 Imperial air compressor. There are 10 buildings, including a warehouse and office.

UNITED STATES COPPER-GOLD CO.

WASHINGTON

Office: Chewelah, Stevens Co., Wash. H. W. Brooks, pres.; H. T. Spedden, sec.; C. M. Grove, treas., at last accounts. Owns sundry claims, slightly developed. No trace of recent operations, and presumably defunct.

UNITED STATES METALS REFINING CO.

NEW JERSEY

Office: 42 Broadway, New York. Works office: Chrome, Middlesex Co., N. J., and Grasselli, Lake Co., Ind. Wm. G. Sharp, pres.; L. Vogelstein, vice-pres.; F. Y. Robertson, vice-pres. and gen. mgr.; E. J. Hothorn, sec.; F. W. Batchelder, treas.; preceding officers, Chas. G. Rice, A. F. Holden and A. G. Todd, directors; Lawrence Addicks, supt. Chrome works; Wm. Thum, supt. Grasselli works.

Organized Nov., 1903, under laws of New Jersey, and reorganized Oct. 15, 1906, capitalization \$4,000,000, shares \$100 par, half in 7% cumulative preferred and half in common shares; issued \$3,100,000, half preferred and half common stock. Is controlled, jointly, through stock ownership, by the United States Smelting, Refining & Mining Co., and Aaron Hirsch & Sohn, of Halberstadt, Germany. Annual meeting, second Tuesday in May.

The Chrome works, which have had to be enlarged nearly every year since they were first built, include a complete smelting and converting plant for the treatment of ores, concentrates and mattes, with smelting capacity of 15,000 to 18,000 tons a month, converting capacity of 3,500,000 to 4,000,000 lbs. of blister a month, and an electrolytic refinery with a capacity of from 15,000,000 to 18,000,000 lbs. a month.

The smeltery has two 42x180" blast furnaces, two 84x120" basic-lined converters and one 60x6' rotary kiln for sintering fine material. The smeltery is further equipped with a 500' steamship dock, with berth for 2 steamers, the most modern type of Fairbanks scales, having a sensitiveness of 10 lbs. on a load of 100,000 lbs., and a very complete automatic sampling mill, equipped with Brunton samplers.

The refinery has one 225-ton and two 175-ton anode furnaces and two 225-ton wire-bar furnaces, equipped with charging cranes, casting wheels, waste heat boilers and the most modern devices for mechanical handling. The tank house has 896 tanks arranged on the Walker system.

The power house is steam-driven and arranged for highest economy with economizer and superheater equipment, 3 compound condensing units and 1 triple expansion unit, using an exhaust steam turbine for the third expansion. Current is generated at the rate of 11,500 amperes, but changes are now under way to raise this to 13,000 amperes. Three circuits are carried in the tank house with a voltage of 115 volts each, 1 power unit being carried in reserve.

The anode slimes are refined by the usual processes, the doré bullion produced being parted electrolytically. Some of the rarer elements are recovered as byproducts.

The Grasselli plant, consisting of a 75-ton electrolytic lead refinery, at

Grasselli, a suburb of Chicago, was the first electrolytic lead refinery in the United States.

The plants of the United States Metals Refining Co. are strictly modern in design and equipment and are noted for the technical excellence of their practice and the purity of their commercial products.

UNITED STATES & MEXICAN MINING CO.

MEXICO

Letter unclaimed at former office: 42 Murray St., New York. Mine office: Hostotipaquillo, Jalisco, Mex. Isaac P. Martin, manager, at last accounts. Lands include the Trinidad and Guadalupe mines, carrying auriferous and argentiferous copper and lead sulphides. Has water power. Presumably idle.

UNITED STATES MINING CO.

COLORADO & WYOMING

Office: 37 Wall St., New York. Henry T. Clarke, Jr., pres.; John T. Clarke, vice-pres. and treas. Capitalization \$1,500,000, shares \$10 par, in \$500,000 preferred and \$1,000,000 common shares. Is a securities-holding corporation only, controlling a majority of the outstanding stock issue of the Doane Verde Mining Co., and share interests in the Battle Lake Tunnel Site Mining Co., Penn-Wyoming Copper Co. and Newsboy Mining & Milling Co., all defunct, and also owns an interest in a tract of mineral land near the Reindeer, Bessie Wilgus and Coon Valley mines, at Leadville. Lake Co., Colo.

UNITED STATES MINING CO.

UTAH

Office: 55 Congress St., Boston, Mass. Operating office: 920 Newhouse Bldg., Salt Lake City, Utah. Mine offices: Bingham Canyon, Salt Lake Co., Utah, and Eureka, Juab Co., Utah. Wm. G. Sharp, pres.; C. G. Rice, vice-pres.; Frederick Lyon, vice-pres. in charge of operations; F. Winthrop Batchelder, sec.-treas.; Albert F. Holden, managing director; preceding officers, E. L. Carpenter, B. Preston Clark, J. J. Storrow and Sidney W. Winslow, directors; Hon. Clarence E. Allen, mgr. of mines; C. F. Moore, cons. engr.

Organized 1899, and reorganized 1901, under laws of Maine, capitalization \$15,000,000, shares \$25 par. Is controlled, through ownership of 99% of stock issue, by United States Smelting, Refining & Mining Co., stock control having been obtained through exchange of shares, with a cash bonus paid to the United States Mining Co. Controls the United States Smelting Co., the Centennial-Eureka Mining Co., Niagara Mining Co. and owns a half interest in the International Metals Selling Co. National Shawmut Bank, Boston, registrar. Annual meeting, in October.

The properties at Bingham include the Old Jordan, Telegraph, Commercial, Galena and adjoining claims.

The Old Jordan and Telegraph mines were silver properties originally, opened on a fissure vein of silver-lead ore, crossing the big sulphide copper dike from which production has been secured latterly. The Old Jordan group has about 5 miles of workings, developing a large amount of ore. Copper ores range from 1.5 to 8% copper, 2 to 5 oz. silver and \$1 to \$2.50 gold per ton.

The Galena mine, reopened 1905, is said to have produced upwards of \$1,000,000 worth of ore, under previous ownership, with average smelter returns of 20% lead, 25 oz. silver and up to \$10 gold per ton. The mine carries low-grade copper values, in addition to auriferous silver-lead ores, with a productive capacity of about 400 tons daily.

The Centennial-Eureka mine, in the Tintic district, is described under the title of its owner, the Centennial-Eureka Mining Co.

In addition to its metalliferous mines, the United States Mining Co. owns iron mines and a large limestone quarry, supplying flux, and has coal

mines, with a coking plant in connection. The advantages pertaining to control and ownership of ores, fluxes, fuel and smelter, under a single management, are very great.

Smelting is done by the United States Smelting Co., a subsidiary corporation, the smelter being described under title of its owner. Further details regarding closely related interests will be found in the descriptions of the United States Smelting Co. and United States Smelting, Refining & Mining Co.

UNITED STATES MODERN MINING CO.

WASHINGTON

Office: Bellingham, Wash. Letter unclaimed at former mine office. Glacier, Whatcom Co., Wash. Lands, 5 miles from Shuksan and 19 miles W. of Glacier, on the headwaters of the Nooksack river, show contact deposits, between granite-porphry and slate, of which 1 vein of 25' reported average width carries ore giving good assay values in copper, zinc, silver and gold. The mine has about 150' of tunnels. Idle several years and apparently dead.

UNITED STATES SMELTING CO.

UTAH

Office: 55 Congress St., Boston, Mass. Operating office: 920 New-house Bldg., Salt Lake City, Utah. Works office: Midvale, Salt Lake Co., Utah. Wm. G. Sharp, pres.; C. G. Rice, vice-pres.; Albert F. Holden, managing director; preceding officers, S. W. Winslow, B. Preston Clark, E. L. Carpenter and J. J. Storrow, directors; F. W. Batchelder, sec.-treas.; Geo. W. Heintz, gen. mgr.; L. D. Anderson, smelter supt. Is controlled, through ownership of entire capital stock issue, by the United States Mining Co., which in turn is controlled by the United States Smelting, Refining & Mining Co.

Lands are a smelter site of 150 acres, near the former sites of the Utah Consolidated and Bingham smelters, 12 miles from Salt Lake City and about 80 miles from the Tintic camp, on the bank of the Jordan river. The works include a sampling mill, lead concentrator and electrostatic plant for the separation of zinc and iron from lead ores, a lead smelter, an arsenic plant, a baghouse, and a calcining plant, also a copper smelter now idle. The company owns its own limestone quarries at Toplift.

The sampling mill has a 10x20" Blake crusher, a Gates gyratory crusher, a set of Davis rolls, a set of Colorado Iron Works rolls, and a Synder sampler, giving a final sample of 1 part in 720.

The concentrator, 350 tons daily capacity, is on the bank of the Jordan river, about one-half mile S. W. of the smelter. Equipment includes a Blake crusher, Allis-Chalmers rolls, a Denver Engineering Works tube mill, Hartz jigs, Overstrom and Wilfley tables, Sherman slimers, Callow tanks, trommels, elevators and centrifugal pumps. Water is taken from the Jordan river, by gravity, through a 7-mile canal. Concentration is about 2 into 1, with an extraction of 92 to 95% of the lead and zinc, 85 to 90% of the gold and silver, and 80% of the copper, by assay values.

The electrostatic mill treats zinc middlings made by wet concentration. This mill, of 75 tons daily capacity, is 40x40' in size and 3 stories high, adjoining the concentrator. Zinc middlings go to a dryer-bin in the top story, dropping thence to 2 Bartlett & Snow dryers, of 50 tons capacity, consisting of 9x7x22' and 11x7x20' chambers. From the drying chambers middlings go to 9 roughing jigs on the third floor, and 12 finishing jigs on the second floor, and are screened through trommels of 16, 40, 60 and 90 mesh, passing to rolls and going thence to Huff separators, of which there are 15, made in sections, each 6' 6" long, 18" wide and 24" high, each containing 2 electrodes. The electric generating apparatus is contained in a room on the second floor.

The smelter has a lead and a copper department of about 1,200 tons daily capacity each. The copper smelter, idle for several years, has six 200-ton water-jacket blast furnaces, and a 125-ton reverberatory furnace. Pyritic smelting, employed originally, was abandoned. The converter department of the copper smelter has 2 stands, with an electric traveling crane and silica mill, and the works include a briquetting plant for fines. The smelter has a 300' steel stack, connected with the furnaces by flue, with separate brick flues leading to a baghouse.

The lead smelter has six 200-ton blast furnaces, each having 2 water-jackets on each side, and 1 on each end, with ten $3\frac{1}{2}$ " tuyeres on each side, the furnaces being 48x160" at the tuyeres, widening to 132x160" in the shaft. The crucible is elliptical, firmly braced by four 5" I-beams, stayed with $2\frac{1}{2}$ " bolts. Lead matte is tapped to shallow circular moulds, in which anchors are placed, for imbedding in the cast matte, for handling by a monorail crane, running to the end of the building, where matte is broken by sledging and sent to the calcining department. Slag is tapped to the forehearth, which have hoods for the fumes, through a pipe, and slag runs into cars hauled by electric locomotives for transportation to the dump. Slag cars are tapped through a hole 8" above the bottom and buttons and shells carrying 0.6 to 0.9% lead are returned to the blast furnace bins for resmelting. Fumes discharge from each furnace through a 3x6' downtake, to a 15x180' balloon flue leading to a rectangular brick flue chamber, with hopper bottom, terminating in the fan house.

The matte, assaying 7 to 10% copper, 12 to 15% lead, 3 to 4% zinc, 21 to 23% iron and 21 to 23% sulphur, is taken to the roaster plant, which has 2 Wedge roasters, and after roasting is taken to the sulphide mill, which has a 20x10" Blake crusher, rolls, elevators and trommels, driven by a 50-h. p. 440-volt General Electric induction motor. The crushed matte from the sulphide mill then goes to a 30-ton reverberatory furnace, 8x12x20' in size, treating crushed matte of about 40% copper tenor, and making white metal of about 80% copper tenor, sent to the United States Metals Refining Co., at Chrome, N. J., for conversion. Lead is drawn off through an Arents siphon, to pots, and wheeled to the bullion house, where it is dumped into 3 melting kettles, set in a brick furnace. The molten lead yields first a dry dross, consisting mostly of copper, which is skimmed off, and, after the temperature is lowered a wet dross of antimony and arsenic is skimmed, this being sent to a sweating furnace and the lead sweated out as far as possible. The residue are sent to the blast furnaces. After skimming and sweating, the lead is drawn from the melting pots through iron siphon pipes and cast into anodes, which are sent to the Grasselli works of the United States Metals Refining Co., for electrolytic refining.

The lead plant includes 26 converter roasters and 4 Dwight sintering machines, adapted to raw ores. Each converter roaster consists of a 3x6x6' brick-lined square shell, with a 3' hood, and a bottom of grate bars, through which a 9-oz. blast is blown. Charges require about 12 hours' treatment, and sinter to a solid cake, which is discharged by a ram, like coke from a byproduct oven, after which the sinter cakes are broken in a Blake crusher and crushed material is conveyed automatically to steel cars, going thence to bins in the furnace house where mixed with charges for the blast furnaces.

The brick baghouse is 60x283' in ground section, and 58' high, with 2 floors, 1 a basement and the other the thimble floor, divided into 8 compartments, 3 for roast gases and 5 for blast furnace fumes. The floor is of steel, underneath which is a 12' basement, with 8 cellars, each divided into 3 sections. There are 2 fans, driven by a 100-h. p. electric motor, draw-

ing smoke and fumes from all parts of the works. The gases, having an initial temperature of 300° C., are cooled by passing through 3 series of steel tubes, from one brick chamber to another, 10 tubes, each 2' in diameter and 20' long, connecting each chamber, the gases finally going through a pipe 30' long and 6' in diameter into the baghouse. Each of the 5 blast-furnace bays has 416 bags and each of the 3 roaster bays has 420 bags, each bag being 18" in diameter and 32' 6" long, woolen bags being used for roast gases, and canvas bags for the blast-furnace gases. The bags are hung vertically with metal thimbles at top and bottom, the upper ends being closed and lower ends opening into the dust cellars, the floor of the baghouse above the basement having 18" circular holes with thimbles 6" high and 18" in diameter, extending upward from each hole, over which the feet of the bags are slipped. Apparently the bags wear for a long time. Gases, after leaving the baghouse, contain less than 0.75%, by volume, of sulphurous fumes, this amount being the maximum permitted by the courts. Each blast-furnace bay has a separate stack, 6x100' in size, and the gases from the 3 roaster bays discharge through a steel stack 235' high and 16' 6" in diameter.

The baghouse saves considerable zinc, lead and silver, previously lost through volatilization. The dust from the bags returns about 30% lead, with a heavy proportion of arsenic. Patents have been issued in connection with a new process providing for the neutralization of sulphurous gases with zinc oxide, to form zinc sulphate, which is retained in the baghouse, the reaction taking place in the flues while the fumes pass to the baghouse at a temperature a little higher than 100° C. The baghouse produces zinc oxide from crude zinc sulphide and other materials not yet disclosed, which is mixed with 50%, by weight, of crushed coke, dampened and fed upon the grates of a battery of 5 small furnaces, each about 15' long and 3' wide, with party walls, the mixture being maintained at a thickness of about 12" upon the grates, each furnace having a capacity of 5 tons daily.

The arsenic plant, installed 1909, is very complete. The dust collected on the basement floor of the baghouse, from blast-furnace fumes, is taken in 5-ton motor cars to the arsenic plant and dumped into storage bins. From these bins it is carried by handcars to charge hoppers feeding 2 Brunton arsenic furnaces, of 16 tons daily capacity respectively, yielding about 2 tons of finished product daily. The charge hoppers are kept continually full to prevent air entering the furnace, each hopper having a steel rod with revolving vanes, keeping the charge loosened so it flows freely, regulation being effected by raising or lowering the cast-iron sleeve connecting the spout of the hopper with the furnaces. Each furnace is circular built of fire brick, with a sheathing of 3/16" steel, 14' 6" in diameter and 3' high, with a 9" crowned roof at the center. Each furnace has a revolving hearth, of 14' diameter, actuated by a 5" spindle, on which is mounted a 66" gear wheel, driven by a 12" gear connected with a worm on the shaft, which is belted to a 5-h. p. motor, 1 motor driving both furnaces, a clutch on the 66" gear allowing individual control. A period of 5 minutes 17 seconds is required for one revolution, at which speed 10 to 12 hours are required to work the charge from the center of the hearth, where received, to the edge. The hearth is supported by 8 circular angle irons, on which is laid a 2" course of fire brick, surmounted by 1" of cement, forming the surface of the hearth. Further support is given by 12 radial steel arms. The furnace temperature is about 900° F., which volatilizes the arsenic, but not the lead, and the byproduct remaining after the arsenic has been driven off discharges at the back of each furnace by a cut in the wall, with an 8x12" steel overflow

pipe, on a level with the hearth, leading to steel hopper having a cylindrical discharge opening closed by a gate.

Fumes leave the furnace at a temperature of 900° F., and pass to the condensing chambers, recording thermometers being placed along the walls of the chambers, the temperature decreasing to only about 80° F. in the last bay, but the operation of the furnaces is governed more by deposition of arsenic in the chambers than by temperature. The condensing chamber is double, 200' long, 20' wide, with height of 10' for the first 50' of length, and is 8' high for the remaining distance of 150'. Each side is divided, by baffle walls, into 25 bays, so arranged that the fumes are compelled to take a zigzag course in passing through the chamber, each alternate bay having a 3x5' door. Fumes from the condensing chambers are drawn off by a 4' Sturtevant fan, driven by a 10-h. p. motor, and discharged to a chamber at the end having 9 woolen bags, 18" in diameter and 22 to 28' long, bags being shaken down once a shift, a fan and bag equipment being provided for the crude chambers and also for the refined chambers.

The crude product carries 97 to 99% arsenious trioxide, which is removed through the doors, and sent, in buggies, over a monorail crane, to the refining furnace, where charged direct into three 30x66" steel hoppers, in the top of the refining furnace, which is 6x15x25' in size, of ordinary reverberatory type, having a fire-brick lining with 2 fireboxes, each 31x54". Access to the interior of the refining furnace is through three 9x15" doors on each side and a temperature of about 700° F. is maintained. The capacity of the refining furnace being 15 tons daily, and output of crude arsenic being only about 2 tons daily, from each Brunton furnace, the refining furnace is worked only part time. The product of the refining furnace is crystalline arsenious trioxide of 99.87% average tenor, which is sent to a 3' buhr-mill, ground and packed for shipment. The grinding is done in a small room, tightly closed, and connected with an exhaust fan discharging to the crude condensing chamber, so that no arsenic may escape into the air. Workmen about the arsenic plant wear a one-piece suit of overalls, with a hood, furnished by the company, and also wear respirators, when entering the chambers, or otherwise coming in contact with the arsenic. All employes of the arsenic plant are required to take a bath and make a complete change of clothing when going off shift.

The power plant includes steam and electric installations. There are two 400-h. p. Stirling water-tube boilers, generating steam at 140 lbs. pressure, fed by American automatic stokers, with draft induced by a National centrifugal blower, discharging to a 150' steel stack. Electric current, taken from the hydro-electric plant of the Mill Creek Power Co., 10 miles distant, is received at 45,000 volts, and stepped down to 480 volts in three 300-kw. transformers. The current for the concentrator is stepped up to 1,440 volts for transmission and again stepped down at the mill to 480 volts, by a 200-kw. transformer, the power plant at the concentrator including two 75-h. p., one 30-h. p., one 50-h. p., and one 25-h. p. Westinghouse 3-phase 60-cycle 440-volt induction motors. The main power plant includes a 750-h. p. General Electric steam turbine, a 200-h. p. General Electric induction motor, belted to a 150-kw. continuous-current generator; 3 Nordberg tandem-compound Corliss engines, direct-connected to Connersville blowers; one 16x24x36" Nordberg cross-compound Corliss engine, tandem-connected to a 16x30x40" air compressor, having a capacity of 9,000 cu. ft. of free air per minute, compressed to 95 lbs. working pressure, for operating the air-lift pumps, sampling mill, forges and various pneumatic machinery. There is also an electric light plant. Company employs about 600 men.

Further particulars in connection with this company will be found in the description of the United States Smelting, Refining & Mining Co.

UNITED STATES SM., REF. & MG. CO. UNITED STATES & MEXICO

Office: 55 Congress St., Boston, Mass. Sales office: 42 Broadway, New York. American operating office: 920 Newhouse Bldg., Salt Lake City, Utah. Mexican general office: 11 San Bernardo, Mexico, D. F. Wm. G. Sharp, pres.; Chas. G. Rice, vice-pres.; Albert F. Holden, managing director; and B. Preston Clark, Jas. J. Storrow, Sidney W. Winslow, executive committee; Frederick Lyon, vice-pres., in charge of operation; Sidney J. Jennings, vice-pres., in charge of exploration and mining investments; preceding officers, Robt. S. Bradley, Stephen L. Bartlett, Robt. J. Edwards, Galen L. Stone, John W. Weeks, Chas. F. Brooker, Robt. Treat Paine, 2d., Andrew Preston, Frederick Ayer, C. A. Hight, Edw. B. Bayley, S. W. Winslow, Jr., and David A. Ritchie, directors; F. W. Batchelder, sec.-treas.; M. F. Kennedy, asst. to the pres.; John Laurie, comptroller; Carl F. Moore, chief engr.; A. P. Andersen, field engr.; Geo. W. Heintz, traffic mgr. and gen. mgr. United States Smelting Co.; J. H. Horlick, mercantile mgr.

Organized Jan. 10, 1906, under laws of Maine, capitalization \$75,000,000, shares \$50 par, in \$37,500,000 of 7% preferred cumulative stock and \$37,500,000 common stock; issued, \$24,316,000 preferred and \$17,555,250 common stock, March, 1913. The company had 9,131 shareholders Jan. 15, 1912, and had 8,245 holders of preferred shares and 2,557 holders of common shares, March 20, 1913. National Shawmut Bank, Boston, registrar; Old Colony Trust Co., Boston, transfer agent. Annual meeting, in May.

The company ended 1907 with an available surplus of \$4,067,087, which was cut down through adding \$733,255 to reserve, and by various other deductions, to a net surplus of \$557,003. The balance sheet of Dec. 31, 1909, gave current assets of \$11,419,214 and current liabilities of \$5,718,191, leaving an excess of current assets over current liabilities of \$5,638,022, and the company ended 1912 with excess of current assets of \$9,013,408, and surplus of \$3,648,722. Net earnings were \$3,504,522 in 1906; \$2,386,539 in 1907; net earnings of \$3,535,556, with deduction of \$517,609 for depreciation, reserves and general expenses, leaving a net profit of \$3,017,947 in 1908; net earnings of \$4,155,012, less deductions of \$1,018,652, leaving a net profit of \$3,136,360 in 1909; net earnings of \$3,738,540, and net profit, after deductions, of \$2,484,318 in 1910; net earnings of \$3,961,102 and net profit, after deductions, of \$2,840,412 in 1911; net earnings of \$5,497,965 and net profit of \$4,232,965 in 1912.

The company's dividend rate is 7% on preferred stock, payable in quarterly dividends of $1\frac{3}{4}\%$, January, April, July and October, first dividend having been paid April 15, 1906. Dividends on the common stock, begun 1907, are 6% yearly, in quarterly dividends of $1\frac{1}{2}\%$, giving dividend requirements for both preferred and common shares of \$2,755,000, yearly. Dividends were \$1,700,963 on preferred and \$701,961 on common shares in 1909; \$1,701,700 and \$703,100 in 1910; \$1,702,120 and \$702,209 in 1911; \$1,702,120 and \$877,762 in 1912, making a grand total of \$16,471,458 paid to end of 1912.

Company is a securities-holding corporation only, controlling, through practically entire stock ownership, the United States Mining Co., United States Smelting Co., Mammoth Copper Mining Co., Needles Mining & Smelting Co., United States Store Co., United States Lime Co., Gold Road Mines Co., and United States Smelting, Refining & Mining Exploration Co. The company also controls, through ownership of a large majority of stock, the Centennial-Eureka Mining Co. and Bullion-Beck & Champion Mining Co., and owns a majority of both preferred and common stock issue of the

American Exploration Co. The company controls, through practically entire stock ownership, the Compañía Minera Real del Monto y Pachuca of Mexico, which property was bought for 3,800,000 pesos; owns a half interest in the United States Metals Refining Co., the other half being owned by Aron Hirsch & Sohn, of Halberstadt, Germany; has a large interest in the International Metals Selling Co., and owns a majority interest in the shares of the Richmond-Eureka Mining Co. The company also owns the Last Chance mine of 14 patented claims, purchased 1913, of the Consolidated Nevada-Utah Corporation for a sum said to be \$100,000, and late 1913, took an option running to March, 1915, on the Ebner group, in Alaska, on which the company has agreed to spend \$200,000 in development work. The various subsidiary corporations are described separately, under their respective titles. Control of the United States Mining Co. was secured by exchanging stock, three-fourths in preferred and one-fourth in common shares of the United States Smelting, Refining & Mining Co. having been given, share for share, plus \$1 per share cash bonus, for each share of United States Mining Co. The company is said to own or control 82 different mines in Mexico, and is popularly credited with planning the location of a smelter on Puget sound.

Production, including the outputs of all subsidiary corporations and metals from custom ores treated, has been as follows:

Year.	Lbs. copper.	Lbs. lead.	Oz. silver.	Oz. gold.
1906.....	33,856,287	27,828,644	4,852,292	162,537
1907.....	38,518,378	53,617,324	6,739,269	235,822
1908.....	32,803,603	27,304,347	8,340,566	128,208
1909.....	36,672,606	41,627,995	9,637,119	128,393
1910.....	28,430,425	51,450,985	10,776,465	113,246
1911.....	22,199,141	49,022,791	10,285,150	118,703
1912.....	21,152,620	56,385,769	12,059,829	140,183

UNITED TINTIC MINES CO.

UTAH

Office: Atlas Blk., Salt Lake City, Utah. Mine office: Silver City, Juab Co., Utah. B. H. Bullock, pres.; H. J. Fitzgerald, sec.-treas.; F. H. Bemis, mgr.; preceding officers, A. Starrh, I. A. Smoot and J. I. Bullock, directors; Elmer Duncan, supt.

Organized, 1911, as a consolidation of the Tintic Empire, Tintic Combination and Bullock companies, capitalization \$1,000,000, shares 50 cts. par, assessable; issued 1,650,000 shares. An assessment of one-fourth cent per share was levied May, 1913. Stock listed on the Salt Lake Stock Exchange.

Lands, 28 claims, about 600 acres, in the Tintic district, near Eureka. The property shows 4 parallel veins in an ore zone, or channel, that lies E. of the Mammoth-Grand Central and the Centennial-Eureka ore zones. The claims are so located as to give approximately 2 miles on the strike of this vein system. Ores are copper, lead, silver and gold.

Development is principally on the Old Bullock property. The mine has shafts of 310', 215' and 102' and several old tunnels. The veins vary greatly in width, but are generally of small size, the Bullock vein, in which work has been centered, showing a maximum width of about 4'. The ore in this vein runs high in iron and carries about \$40 per ton in copper and silver. A test shipment of ore made early 1913, yielded 8.12% copper, 8% zinc, 27.8 oz. silver and \$1.10 gold per ton. The workings above the 210' level are under lease to O. J. Doyle.

Equipment includes a small steam plant with hoist.

UNITED VERDE COPPER CO.

ARIZONA

Office: 20 Exchange Place, New York. Mine office: Jerome, Yavapai

Co., Ariz. Wm. A. Clark, pres.; Jas. A. MacDonald, vice-pres.; J. H. Anderson, sec.; H. H. St. Clair, treas.; Chas. W. Clark, gen. mgr.; officers are the directors; Will L. Clark, asst. mgr.; Robt. E. Tally, mine supt.; Thos. Taylor, smelter supt.; Clarence V. Hopkins, mg. engr.; Dave Hopkins, purch. agt.; A. L. Reese, chem.-assayer.

Organized 1883, under laws of New York and reorganized Sept., 2, 1899, under laws of West Virginia, capitalization \$3,000,000, shares \$10 par; fully issued and fully paid. Is practically a close corporation, having less than 20 shareholders, and is controlled, through stock ownership, by W. A. Clark. Stock transfers are noted only at rare intervals. Five hundred shares were sold at auction, March, 1910, for \$70 per share.

Gross sales of copper, silver and gold were \$5,368,672 in 1909, \$5,605,488 in 1910, \$4,736,834 in 1911, and \$5,899,457 in 1912. The company's investments on Dec. 31, 1912, were valued at \$1,726,394, compared with \$1,666,394 at end of 1911 and 1910 and \$1,422,441 at end of 1909. Cash on hand and in bank totaled \$158,423, Jan. 1, 1913.

Dividend payments were begun, 1892, by old company on the basis of 25 cts. per share monthly. Recent dividends have been as follows: \$2,005,000 in 1905, \$2,700,000 in 1906, \$2,700,000 in 1907, \$2,025,000 in 1908, \$2,700,000 in 1909, \$2,700,000 in 1910, \$2,250,000 in 1911, \$1,800,000 in 1912 and \$1,350,000 to Oct. 1, 1913, a grand total of \$32,797,000.

Lands, 13 claims, patented, 230 acres, with sundry adjoining property, including the North Venture and South Venture claims, which have produced a little high-grade ore, in the Verde district of the Black Hills range, at an average elevation of 5,600' above sea level, and about 1,800' above the valley of the Verde river. The property shows porphyritic rocks, slate and schist, the mine being in a zone of slates and intrusive dioritic rocks, the neighboring limestone being superimposed unconformably and apparently having no genetic connection with the ore deposits. Company also owns the Copper Giant mine, near Hackberry, acquired 1913, and described elsewhere under that title.

The mine is opened on a single large deposit of sulphide ore, in slate that is considered a sheared diorite, about 600' in extreme width and 1,900' length, proven to depth of 1,500'. The orebody consists of more or less irregular masses, in a much broken and disturbed area, the ore shoot having a dip of 72° and containing a 70' quartzite dike that carries about 1% copper and from 0.25 to 0.75 oz. gold per ton, this quartzite being used for converter linings. The gossan outcrop, originally carrying auriferous and argentiferous oxidized ores to a depth of about 160', has been worked out. The zone of secondary enrichment carries mainly chalcocite, with some covellite, and other secondary copper ores, all highly argentiferous. The primary zone carries mainly chalcopyrite, with a little bornite. No ore assortment is attempted, and no concentration is made, everything from the mine going to the furnaces, the average of ore from all openings formerly being about 6.5% copper and 15 to 32% sulphur, with considerable gold and silver values, but the ore mined now is by no means so rich as formerly.

Underground openings are very extensive, with enormous ore reserves, estimated in the papers to amount to 20,000,000 tons, which is probably high. The mine is developed to a depth of 1,500', but production is mainly from the 6th and lower levels. The older portions of the mine are worked pillar-and-stall and timbered with square sets, filled with waste, worked-out stopes being filled with culls, and occasionally with barren rock blasted from the mountainside above the mine and milled into abandoned stopes.

The oxidized zone has been mined by open cut and by the milling system. In the newer workings, and parts of the old mine where the ground will permit, bottom slicing and a modification of the shrinkage system is used.

Development is by No. 3 shaft, 1,500' deep with 12 levels, and No. 4 shaft of 500'. Shafts Nos. 1 and 2 are abandoned. There was also tunnels of 800', 2,640' and 6,593', with electric haulage. No. 3, the main shaft, has 3 compartments and was located 900' from the old main shaft, expecting to sink in country rock throughout, but it cut ore at 600' in depth, considerably extending the known ore limits of the mine. The main shaft has 2 double-deck cages, operated in counterbalance. No. 4 shaft has 2 compartments and is only used for hoisting oxidized ore and ore from the fire zone. The 6,593' drainage tunnel was begun Dec. 23, 1906, and completed Sept. 10, 1908, being driven from both ends in less than 21 months. The tunnel runs from the Verde valley to the 1,000' or bottom level of the mine, draining the entire workings. It is 7x9' in the clear with a 2x2' water conduit underneath, and will eventually become the main haulage level.

The ore is very easily oxidizable, owing to its high sulphur tenor, and is therefore liable to spontaneous combustion, while, owing to the more or less shattered condition of the orebody, it is difficult to entirely prevent the access of air, very little of which will keep a sulphur fire burning incessantly. A serious fire, in Aug., 1902, caused a total suspension of mining, but was controlled by filling the mine with carbonic acid gas, made from crushed limestone and diluted sulphuric acid, the gas passing by natural pressure into the top of the shaft, falling by gravity to the bottom of the mine, and displacing the lighter air. The fire on the 400' level has been burning since 1897, and the mine is on fire in various places, from the 7th level to surface, fire in stopes not worked being walled off by cement bulkheads having steel gates. Mining has been in progress for several years, in the fire zone, under the Plenum system, introduced by J. J. Shaw. By this method, air under pressure is blown against the face of the stopes by electric fans. The air feeds the fire, which is a smouldering one, but drives back the deadly fumes into the shattered rock mass and permits the extraction of ore. The fire, while dangerous and annoying, does not destroy the copper, all of which will be recovered eventually, by mining or leaching.

The mine is subject to bad caves, 1 of which carried down the office building and killed a number of employees some years ago. Owing to fires and caves, the shafts sunk in ore were abandoned and new shafts sunk in the country rock.

The surface plant is located on top of the mine, the precipitous walls of the canyon rendering such a location obligatory, when the mine was opened. Equipment includes a steam plant of about 2,600 h. p., with 2 powerful hoists, and a compound air compressor of 6,000 cu. ft capacity per minute, having steam cylinders of 28" and 52", with 48" stroke and air cylinders of 24" and 44". There is an electric generator direct-connected to a 250-h. p. engine, and electric current is taken from the Arizona Power Co. Fuel is coke, costing \$12.75 per ton for the smelter, and coal and petroleum are used for steaming purposes, there being a 500,000-gal. tank at Jerome Junction, and a 175,000-gal. tank at the mine, for oil storage.

Water is received through 2 miles of 10" pipe from the Walnut Springs dam, but the supply is somewhat scanty.

The precipitation plant was removed to the mouth of the drainage tunnel, the plant consisting of a flume one-half mile long, 5' wide and 10" deep, with a grade of 0.8%, having settling tanks 120' apart, copper being precipitated from the mine water on scrap iron.

The old smelter, built on the hanging-wall side of the mine and too

close to the orebody, has had considerable trouble from caving ground. Present equipment includes 6 water-jacket blast furnaces, 4 handling 500 tons daily and 2 of 48x240" and about 700 tons capacity. There also is a Knudsen furnace of 175 tons daily capacity, operated on the Knudsen discontinuous semi-pyritic process of smelting, for treating ores carrying under 5% copper, but rich in sulphur. The smelter stack has a screen top, to catch the flue dust, which carries high values in gold and silver. Furnace blast is furnished by blowers with a capacity of 20,000 cu. ft. of air per minute at 16-oz. pressure.

The converter room has 8 stands, with 15 shells, and two 50-ton traveling cranes. Converter blast is furnished by 2 Diesel oil engines of 350 and 450 h. p. The product of the converters is shipped East for refining, where gold and silver are parted electrolytically, and the copper is used for wire by the Waclark Wire Works Co., at Elizabeth, N. J.

A new, 3,000-ton smelter is now under construction at Clarkdale, about 6 miles from the mine. The new plant is equipped with 4 blast furnaces and 4 stands of converters, using basic lining. Three of the furnaces are 48x240" and 1 is 56x180", and all have Giroux hot-blast tops, taking blast at from 26 to 28 oz. pressure and heating to 200° F. The larger furnaces have forty 5" tuyeres, each receiving about 33,000 cu. ft. of air per minute. Additional equipment includes 6 Wedge roasting furnaces, 3 reverberatories, each 19x100', 1 Southwick compound blowing engine, 1 Rateau-Smoot steam turbo blower, 1 Diesel double-unit 6-cylinder oil engine and 3 Root blowers. The plant is expected to be in commission about July, 1914.

The United Verde & Pacific railway, controlled by the company, has 28 miles of narrow-gauge line, traversing a very difficult country, connecting the mine and works with the Santa Fé, Phoenix & Prescott railroad at Jerome Junction. A new standard-gauge railway, built 1912, by the Atchison, Topeka & Santa Fé R. R. Co., connects the new smelter and town site of Clarkdale with its main line at Cedar Glade.

Recent production has been as follows:

Year.	Lbs. Copper.	Oz. Silver.	Oz. Gold.	Year.	Lbs. Copper.	Oz. Silver.	Oz. Gold.
1904.	29,275,503	668,842	23,754	1909.	36,694,063	495,480	17,022
1905.	32,683,951	486,041	15,915	1910.	38,663,880	563,133	19,267
1906.	38,827,265	428,317	12,913	1911.	33,167,987	461,145	15,239
1907.	33,015,457	356,938	11,733	1912.	31,565,539	484,222	15,082
1908.	36,183,089	494,574	20,334				

In early years the United Verde made copper for 5 cts. or less a pound, if one deducts gold and silver values from the cost. The reported cost per pound of finished copper, after deducting gold and silver values, was 9.17 cts. per lb. in 1904; 9.27 cts. per pound in 1905; 8.69 cts. in 1906, and 10.54 cts. in 1907. Under average circumstances the cost may be figured as 9 to 10 cts. per lb. The United Verde mine has been lied about more industriously than almost any other mine in the world, especially in the literature sent out by new copper mining companies with stock for sale. The United Verde has been pointed out, as an example of blind luck, but this story is unfounded, the mine having been taken by Senator Clark, when generally considered worked out, and it was developed, by cash and brains, into a magnificent copper mine, the credit being due to the keen mining sense and business acumen of Senator Clark and not to chance. The mine is one of the best copper mines of the world, with many years of large and profitable production ahead.

UNITED VERDE EXTENSION MINING CO.**ARIZONA**

Office: 45 Broadway, New York. Operating office: Prescott, Yavapai Co., Ariz. Mine office: Jerome, Yavapai Co., Ariz. Louis E. Whicher, pres.; Harold Pierce, vice-pres.; Chas. P. Sands, sec.-treas.; Jas. S. Douglas, gen. mgr.; preceding officers, W. W. Cohen, W. J. Maloney, Paul Armitage, W. J. Reid, Archibald Douglas and W. M. Pratt, directors; David P. Morgan, supt. Organized 1902, under laws of Maine, as a reconstruction of the United Verde Extension Gold, Silver & Copper Mining Co., capitalization \$3,000,000, shares \$10 par, reorganized under laws of Delaware, capitalization \$4,000,000, shares \$10 par, and again reorganized 1912, and capitalization reduced to \$750,000, shares 50 cts. par, nonassessable. In this reorganization, approximately 360,000 shares were set aside for exchange, on a share for share basis, for old shares outstanding; about 40,000 shares were issued in liquidation of debts; 150,000 shares were issued to Jas. S. Douglas for services; 50,000 shares were sold to Mr. Douglas for \$25,000 cash; 400,000 shares were optioned to Mr. Douglas and his associates with the right to purchase all or a part of this block at par value at any time prior to June 15, 1915; and 500,000 shares were reserved for treasury purposes. Federal Trust Co., Boston, registrar; State Street Trust Co., Boston, transfer agent. Shares are listed on the Boston curb. Annual meeting, in October.

Lands, 5 claims, patented, about 75 acres, known as the Little Daisy mine, a two-thirds interest in the adjoining Florencia claim, and a 3-year option on the Jerome Verde group of 26 claims, about 500 acres, adjoining the Little Daisy on the N. and E.

The mine has a tunnel, but is developed mainly by an 800' vertical shaft on the Little Daisy claim, about 1,700' from the main shaft of the United Verde mine, with collar 450' lower. This shaft, after passing through 50' of iron stains, encountered copper carbonates, continuing for depth of about 150', succeeded by conglomerate, and from a depth of 425' to 578' passed through schist carrying copper sulphides and manganese. The mine has about 1 mile of openings, showing a little ore of about 2% copper, 1 oz. silver and \$3 gold, on the 800' level. A 130' winze below this level was bottomed in decomposed schist, showing considerable copper, Aug., 1913. A new shaft has been started at a point about 1,500' E. of the present shaft, for the purpose of exploring at greater depth and also to open the area embraced in the Jerome Verde group. This shaft was 800' deep Nov., 1913, and will be pushed to a depth of 1,200 or 1,400' with all possible speed.

Equipment includes an electric hoist and air compressors. Electric power is used throughout, current being taken from the Arizona Power Co. About 35 men are employed. Property considered promising and management good.

UNUK RIVER MINING & SMELTING CO.**ALASKA**

Mine office: Ketchikan, Alaska. J. W. Daly, manager, at last accounts. Property, on the Unuk river, which empties into Burroughs bay, carries gold and copper ores. Equipment includes a small steam plant. Presumably idle.

U. P. R. MILLING & MINES CO.**COLORADO**

Robt. L. Martin, agent, 310 Quincy Bldg., Denver, Colo.; Herman Lundberg, supt., Central City, Gilpin Co., Colo. Property, the Gregory-Buell group of mines at Central City and the Buell concentrator. Mines have vein with gold and silver-bearing copper ores, developed by 700' shaft, equipped with steam hoist and air compressor. The mill has 45 stamps and handles about 130 tons daily.

URUACHIC MINING & SMELTING CO., LTD.**MEXICO**

Office: 168 St. Vincent St., Glasgow, Scotland. Letter unclaimed at former mine office: Uruachic, Chihuahua, Mex. Dr. Henry D. Boddington, mgr.; W. C. Tait, J. Campbell, J. A. Roxburgh, and T. Macnair, directors; J. M. Davies, Jr., sec.; M. T. Boddington, supt., at last accounts. Organized Oct. 19, 1906, under laws of Great Britain, capitalization £11,000, shares £1 par; issued £10,800, fully paid.

Property, 10 pertenencias, known as La Republica mine, carries copper and lead ores. Equipment includes steam power, an air compressor, a 50-ton concentrator and a smelter with a reverberatory furnace rated at 25 to 50 tons daily capacity. Presumably idle.

UTAH-APEX MINING CO.**UTAH**

Office: 79 Milk St., Boston, Mass. Mine office: Bingham Canyon, Utah. F. A. Schirmer, pres.; J. J. Murphy, vice-pres.; C. G. Schirmer, sec.-treas.; H. M. Burton, asst. treas.; W. L. Creden, mgr.; preceding officers, Louis Ross, R. F. Haffenreffer, C. M. Brewer and J. W. Saladine, directors. Stanley C. Sears, mine mgr.; V. S. Rood, supt.

Organized May, 1902, under laws of Maine, as a merger of the Copperfield Mining Co. and York Mining Co., capitalization \$2,500,000, increased 1906, to \$3,000,000, shares \$5 par; issued 528,000 shares. Bonds, \$500,000, authorized, at 6%, convertible; outstanding \$189,000, July 1, 1913. Company absorbed the Highland Boy, Petro, Minnie and Phoenix mining companies. For fiscal year ending Sept. 1, 1912, gross ore sales were \$654,752, with mining costs of \$402,806, leaving a mining profit of \$251,946. Company ended year with \$98,098 cash on hand. Net earnings for the quarter ending June 30, 1913, were \$83,198. Federal Trust Co., Boston, registrar; State Street Trust Co., Boston, transfer agent. Annual meeting, second Tuesday in September.

Property, 33 claims, 254 acres, including the York, Copper Field, Petro, Highland Boy Consolidated and Phoenix groups, adjoins the Utah Consolidated on the S. and W., on York hill, Carr Fork canyon. Claims show limestone and quartzite, carrying the Parnell, Petro, York and Andy bedded veins. These veins are cut by several fissures which have been more or less developed. The Dana, the principal orebody, is apparently a contact deposit between quartzite and limestone, showing an ore shoot standing vertically, without disseminations in the contact, up to 15' in width and 500' in length on the 4th level. The mine primarily is a producer of high-grade lead ore, but has considerable copper, and all ores carry silver and gold values with an excess of iron, giving low smelting charges. First-class ores carry about 2% copper, and \$6 to \$8 combined gold and silver values per ton, the second class copper ores carrying about \$3 per ton in combined gold and silver values. First-class lead ores carry 35 to 50% lead, with silver and gold values, and second-class lead ores range 7 to 14% in lead tenor, with small gold and silver values.

The mine, opened by 3 shafts and 6 tunnels, has about 48,000' of workings. The tunnels, known as the Parnell, Minnie, Smilax, Andy, Andy No. 2 and Parvenu, are spaced at 200' vertical intervals, and are connected by incline blind shafts, having electric hoists, on the Parnell vein, which is estimated by the company to be 5' in width and to be mineralized for about 1,000' in length and to 2,000' in depth. The Andy tunnel develops 3 ore shoots, on the Parnell vein. The Parvenu tunnel, which is the principal working, is about 1 mile in length, cutting the Parnell vein with a back of about 2,200'. Since the decline in the copper market 1907, attention has been devoted mainly to silver-lead ore. A silver-lead orebody

opened in the Parvenu tunnel, having a maximum thickness of 100', with a width of better than 100', and length undetermined, shows direct-smelting ore of 15 to 20% lead, with 3 to 5 oz. silver per ton, and excess of iron, estimated to carry net values of \$8 to \$10 per ton. Ore in sight and partly developed is estimated at 100,000 tons.

A 3,000' Bleichert aerial tram, not in present use, runs from the portal of the Andy tunnel to a loading station. Ore is shipped over a spur track of the railway line of the Utah Copper Co.

Equipment includes two 15-drill air compressors and 2 electric hoists, 1 of which is a double-drum Davis hoist installed at the 7th level station in the Parvenu tunnel.

The old Phoenix mill at the mouth of the Parvenu tunnel was dismantled and a new 200-ton mill built 1909, on the same site. The new mill is said to effect a concentration of 4 into 1, with a saving of about 77% of assay values. Company was planning, late 1913, to increase the capacity of the concentrator to about 350 tons daily. Production was at the rate of about 50 tons of silver-lead ore and 150 tons of concentrates daily, Nov., 1913. Property considered promising.

UTAH-ARIZONA GOLD & COPPER MINING CO.

ARIZONA

Idle. Office: 107 Continental National Bank Bldg., Salt Lake City, Utah. Mine office: Chloride, Mohave Co., Ariz. Heber S. Cutler, pres.; J. F. Shelley, vice-pres. and gen. mgr.; John W. Geiger, sec.-treas.; preceding officers, L. G. Burton, Henry Green, Geo. F. Shelley and W. J. Burton, directors. Organized Nov. 11, 1907, under laws of Arizona, capitalization \$1,000,000, shares \$1 par, assessable; issued \$715,675. Annual meeting, second Tuesday in September.

Lands, 60 claims, unpatented, about 1,200 acres, and a 20-acre mill site, in the Weaver district, 18 miles N. W. of Chloride, the nearest rail point, show quartz veins traversing granite and mica-schist, carrying gold-copper ore. Property includes the Golden Gate mine, having 2 incline shafts of 125' and 135', on parallel veins, and there are several short tunnels, with total of about 2,000' of workings. Equipment includes a 5-stamp mill.

UTAH CONSOLIDATED MINING CO.

UTAH

Office: 42 Broadway, New York. Operating office: 608 Dooly Block, Salt Lake City, Utah. Mine office: Bingham Canyon, Utah. R. H. Channing, Jr., pres.; Adolph Lewisohn, vice-pres.; C. N. King, second vice-pres.; Sidney Chase and Maxwell Woodhull, directors; A. H. Melin, sec.-treas.; Frederick Cowans, gen. mgr.; A. S. Winther, supt.; T. S. Van Wagoner, purch. agt.

Organized 1903, under laws of New Jersey, capitalization \$1,500,000, shares \$5 par, as a reconstruction of Utah Consolidated Gold Mines, Ltd., a British corporation that in turn succeeded the Sevier Gold Mines, Ltd., Oct., 1896. Property of the Utah Consolidated Mining Co. is 2,490 shares of the 2,500 shares of the capital stock of the Highland Boy Gold Mining Co., of New Jersey, the latter corporation holding direct title to the Utah properties. The company also owns 5,000 shares of stock of the International Smelting & Refining Co., which cost \$500,000 and is returning \$40,000 yearly in dividends. The company has about 4,500 stockholders. Shares are listed on the Boston Stock Exchange. Annual meeting, first Tuesday in April.

The company's total income for 1912 was \$1,677,919 with surplus of liquid assets over liabilities of \$1,257,197. Net earnings were \$1,038,637 in 1903, \$1,164,348 in 1904, \$1,887,385 in 1905, \$2,835,008 in 1906, \$1,179,412 in

1907, \$326,312 in 1908, \$154,263 in 1909, \$65,348 in 1910, \$438,430 in 1911, and \$603,923 in 1912.

Dividends of the present company, and its predecessor have been \$732,000 in 1901, nothing in 1902, \$900,000 in 1903, \$900,000 in 1904, \$1,050,000 in 1905, \$1,500,000 in 1906, \$2,100,000 in 1907, \$600,000 in 1908, \$600,000 in 1909, \$150,000 in 1910, \$150,000 in 1911, \$450,000 in 1912, and \$450,000 to Nov. 1, in 1913.

Lands, 31 claims, patented, 239 acres, known as the Highland Boy group, in Carr Fork canyon, $2\frac{1}{2}$ miles from Bingham canyon. A smelter site, in Pine canyon, across the Oquirrh divide, was sold, 1908, to the International Smelting Co. The Highland Boy mine was a considerable producer of silver-lead ore, 1870-90.

Property has 6 ore deposits which are replacements of limestone beds, 150 to 300' thick, with quartzite above and below. These beds dip from 25 to 45° N. and the rocks are cut by a series of porphyry dikes that are nearly vertical and run N. E. The ore deposits form well-defined shoots with an E.-W. strike and N.-E. pitch. They are large, varying up to 100' in width and 100 to 200' in length, and are separated by barren limestone; the largest orebody so far developed is said to be 320' in extreme horizontal width and 340' in length. A new ore shoot carrying galena has been found in the lower workings in an extension of the Yampa limestone. The predominant ore of the mine carries chalcopryrite, with some bornite and chalcocite, associated with pyrite in a limestone gangue. It averaged, in 1912, approximately 2.15% copper, 1 oz. silver and \$1.40 gold per ton. These ore shoots have grown leaner with depth.

Ore reserves were estimated March, 1913, at 251,500 tons of 1.9% copper ore and 36,100 tons of 12.24% lead ore.

The Highland Boy mine is opened by an old 900' shaft, and 7 tunnels, of 1,000 to 2,600' length. No. 7 tunnel, 700' below the crest of the mountain, is 2,600' in length and is the main avenue of extraction, all tunnels being connected, and ore milled, through chutes, to the bottom tunnel. There are 2 blind shafts, deepest 500', starting from the 700' level, with large electric hoists, raising ore to that point for extraction by the electric haulage plant in No. 7 tunnel. The ore breaks easily and is extracted by the top-slice caving system, ore is broken mainly on contract.

New openings were 12,444' in 1905, 10,732' in 1906, 10,120' in 1907, 7,064' in 1908, 8,950' in 1909, 11,433' in 1910, 18,799' in 1911 and 12,320' in 1912.

A 12,700' aerial tram leads from the portal of No. 7 tunnel to ore bins on the Rio Grande Western railway. There is a subsidiary aerial tram, crossing Carr Fork canyon, used for handling lumber and mining supplies. The long tramway from the mine to the Tooele smelter is described under title of the International Smelting & Refining Co.

The smelter, at Murray, described Vol. VIII, was razed 1909, and all material of value therefrom sold to the International Smelting & Refining Co.

The scandal consequent upon the gross overestimate of ore reserves made by J. W. Finch, who accepted the former manager's figures as correct, caused the stock to depreciate to less than half its former price, but resulted in having a technical man of exceptional ability placed at the head of the company.

While the great orebodies of the mine are worked out, the property is far from exhausted and development work is keeping pace with ore extraction.

Production has been as follows:

Year.	Lbs. Copper.	Lbs. Lead.	Oz. Silver.	Oz. Gold.
1904*.....	13,553,483	—————	—————	—————
1905.....	17,264,474	—————	374,685	28,290
1906.....	18,533,974	—————	457,812	42,001
1907.....	13,987,557	—————	390,296	34,554
1908*.....	10,648,243	—————	—————	—————
1909*.....	10,043,900	—————	—————	—————
1910.....	7,489,471	—————	154,321	14,802
1911.....	9,162,023	3,311,939	160,366	16,730
1912.....	6,506,814	8,734,398	230,004	14,042

*Silver and gold production not reported in 1904, 1908 and 1909.

UTAH CONSOLIDATED MINING & MILLING CO.

UTAH

Office: 424 Atlas Bldg., Salt Lake City, Utah. Mine office: Mammoth, Juab Co., Utah. S. S. Jones, pres.; H. S. Cutler, vice-pres.; Hart J. Fitzgerald, sec.-treas.; preceding officers, Hon. Reed Smoot, A. N. Holdaway and Hugh J. Cannon, directors, at last accounts. Organized March 10, 1907, under laws of Utah, capitalization \$250,000, shares 25 cts. par, nonassessable. Shares listed on the Salt Lake and San Francisco exchanges. Lands, 6 claims, patented, near the Sioux Consolidated and Colorado mines, developed by a 500' shaft, with 2 levels opened. Part of the property is worked by lessees, who secure a small production. Inactive.

UTAH COPPER CO.

UTAH

Office: 600 McCornick Bldg., Salt Lake City, Utah. Mine office: Bingham Canyon, Salt Lake Co., Utah. Works office: Garfield, Salt Lake Co., Utah. Chas. M. MacNeill, pres.; Col. Daniel C. Jackling, first vice-pres., gen. mgr. and chairman executive committee; Col. Chas. Hayden, second vice-pres.; Spencer Penrose, sec.-treas.; preceding officers, S. R. Guggenheim, Murry Guggenheim and T. W. Lamont, members finance and executive committee; K. R. Babbitt, gen. counsel; other directors, Silas W. Eccles, K. K. McLaren, C. K. Lipman, John Hays Hammond, Wm. B. Thompson, Frank A. Schirmer and Eugene Meyer, Jr.; Robt. C. Gemmell, asst. gen. mgr.; Samuel Untermyer, associate counsel; Pope Yeatman, cons. engr.; John K. MacGowan, purch. agt.; J. D. Shilling, mine supt.; Wm. Spencer, asst. mine supt.; Frank G. Janney, mill supt.; D. D. Moffat, supt. Magna mill; John M. Hayes, asst. sec. and cashier; C. F. Jennings, asst. purch. agt.; G. O. Bradley, cons. engr.; H. C. Goodrich, chief engr.

Organized June, 1903, and reorganized April 30, 1904, under laws of New Jersey, capitalization \$4,500,000, shares \$10 par, successively increased Oct., 1905, to \$6,000,000; March, 1907, to \$6,060,000; Jan. 24, 1908, to \$7,500,000; Jan. 25, 1910, to \$25,000,000, shares \$10 par, nonassessable; issued \$15,821,700. The new stock issue 1910, amounted to \$8,282,240, of which \$3,100,000 in stock was given for the property of the Boston Consolidated Mining Co.; \$4,445,120, or 444,512 shares, were given for 1,000,152 shares of Nevada Consolidated Copper Co.; \$734,370, or 73,437 shares, were sold for cash, at a premium of 400%, for \$50 per share, and 275 shares were issued for the conversion of \$5,500 of bonds at par. Shares are listed on the New York,

UTAH COPPER CO.

Our Statistical Department will furnish complete information on application.

HAYDEN, STONE & CO.

Members New York and Boston Stock Exchanges.

25 Broad Street, NEW YORK

87 Milk Street, BOSTON

Boston and Paris stock exchanges. D. A. Crockett, 165 Broadway, New York, and American Trust Co., Boston, transfer agents; Guaranty Trust Co., New York, and Old Colony Trust Co., Boston, registrars. Annual meeting, fourth Friday in April.

Net income was \$8,449,272 in 1912, of which \$6,273,272 was secured from the operation of its own property, and the balance came from stock interests in subsidiary companies, earnings comparing with \$2,160,000 in 1909, \$5,401,775 in 1910 and \$623,928 in 1911. The company ended 1912, with surplus and undivided profits of \$12,947,590, and current assets exceeded liabilities by \$1,688,798.

Dividends, begun Sept. 30, 1908, were 50 cts. quarterly, 1908 and 1909, and 75 cts. quarterly, 1910, 1911, 1912 and 1913. Dividends aggregated \$696,387 in 1908, \$1,464,387 in 1909, \$4,648,675 in 1910, \$4,703,022 in 1911, \$4,729,747 in 1912 and \$3,559,882 to Oct. 1, 1913, a total of \$19,802,102.

The company controls the Nevada Consolidated Copper Co. owning slightly more than 50% of the outstanding stock, having exchanged its own stock on the basis of 1 share of Utah for $2\frac{1}{4}$ shares of Nevada. The company controls, through stock ownership, the Bingham & Garfield Railway Co., described later. During 1910 the Utah Co. absorbed the Boston Consolidated Mining Co. and the Shawmut Consolidated Copper Co. A large share interest in the Utah Copper Co. is held by the American Smelter Securities Co.

Company owns 740 acres of mineral claims and 5,282 acres of miscellaneous property, latter including mill sites at Bingham and Garfield, Utah. Mineral lands embrace the original group of 195 acres, bought of the De Lamar-Wall Mining & Milling Co., the Boston Consolidated group of 51 claims, 362 acres, the Shawmut Consolidated group of 100 acres, Pay Roll group of 60 acres, Copper Mining Co.'s claim of 15 acres, and outlying fractional claims of 8 acres area, a total of 740 acres, lying on both sides of Bingham gulch, with principal development on the northern side. Of the mineral lands, 217 acres are more or less developed. Property, other than the main mineral group, consists of 1,239 acres in Bingham canyon; 684 acres in Utah county, and 3,358 acres at Garfield. The claims cover the main mineralized portion of a large intrusive mass, or stock, of monzonite porphyry, breaking up through and surrounded by quartzite and other sedimentary rocks. The ore is this porphyry bleached and speckled with tiny grains and webs of copper glance, chalcopyrite and pyrite.

At points the quartzite flanking the monzonite is mineralized to a sufficient extent to render it an ore of commercial value, and the quartzite ore is treated in precisely the same manner as the porphyry ore. The monzonite, at surface, and for some little depth, carries copper carbonates, of low tenor, probably averaging under 1% copper, though giving a bright showing, because of the tendency of the malachite to stain the surrounding monzonite. The upper portion of the porphyry, carrying oxidized ores, is removed and saved for future treatment by leaching process. The management of the company reckons the average thickness of the overlying capping carrying oxidized ores at 105', and the average thickness of the disseminated ores of commercial tenor as 345', a ratio of 0.3 waste to 1 of ore, consequently 3 tons of capping must be stripped for 10 tons of ore developed for mining, the cost of which stripping is chargeable to the mining cost of the ore. In actual practice it has been found cheaper to send considerable quantities of the over-burden, carrying oxidized ores, to the mill, rather than to employ the large amount of additional labor required to separate the waste thoroughly from the sulphide ore.

The Utah Copper Co. has the largest developed orebody in the world,

its proven tonnage exceeding that of the Rio Tinto, its nearest copper competitor, and even exceeding the proven tonnage of the greatest of the enormous iron mines of the Mesaba range, or the developed tonnage of gold ore of all the combined mines of the Witwatersrand. Not only has the Utah Copper Co. the largest body of developed ore of any mine, but it also is the greatest ore producer, measured by tonnage, of any mine of any metal.

The extent of the ore deposit has been proven by very extensive underground workings and by churn and diamond-drill boring. The aggregate length of all underground openings in the Utah and Boston mines was 78.54 miles to Dec. 31, 1912, but most of these workings have been destroyed by opencuts and underground stoping, leaving accessible only 29 miles. Exploratory churn and diamond-drill boring totaled 27,318' at end of 1912, and show a maximum thickness of 600' of commercial ore. This is underlain by similar material, the limit of mining being determined, not by change in the nature of the ore, but by a gradual shading out with depth of the disseminated sulphides. The cupriferous monzonite continues unaltered to the greatest depth reached by the borings. Ore development, Jan. 1, 1913, is reported to be 337,700,842 tons, of which 257,584,500 are fully developed and 80,116,342 tons partially so, including 28,800,000 tons on the slopes of the steam-shovel workings. Fully developed ore averages 1.6% copper and the partially developed ore 1.16%. The general average is 1.495% copper, based upon 43,296 assay samples, representing 279,529 linear feet of drilling and underground workings.

The original underground mine of the Utah Co., stoped by the top-slice caving system, eventually will be broken into open pits and the entire mine worked opencast. The mine openings are rectangular, laid out like the streets of a city, with blocks above blocks, like the successive floors of a building. There are 13 tunnels entering the hills at approximately right angles to the gulch. These tunnels are avenues, and crossing the avenues at right angles, parallel with the gulch, are streets, these being opened 150' apart. Paralleling the tunnels, or avenues, are drifts corresponding to city alleys, these being 75' on either side of the avenues. The tunnels are 10x10', or larger, and all openings are of exceptionally large dimensions, connections between the various floors being by upraises from alley to alley. Stope levels are opened at intervals of 17' and 25'. The main working tunnel has a double tram track, laid with 30-lb. rails, with electric haulage.

The underground workings of the Boston Consolidated, known as the Sulphide mine, included 15 known orebodies, in an area of about 100 acres. Two veins developed had an E.-W. strike, with average dip of 28° N., the main ore shoot being estimated as 160' wide and 340' in length. This mine yielded a limited amount of ore of better than 10% copper tenor, with corresponding increase in gold and silver values, but the average return, from all ore extracted 1906, was only 2.802% copper and became materially lower thereafter. The old management of the Boston Consolidated estimated that the ores of the Sulphide mine averaged 2.5% copper, 2 oz. silver and \$2 gold per ton. The mine is developed by the Armstrong or No. 1 tunnel, the main working level, having an electric haulage system, and by the Armstrong No. 2, Peabody, Work, Phoenix and Ingersoll tunnels. The Sulphide mine was yielding about 200 tons of ore daily when work was discontinued. The zone is not especially promising for underground work, the ore averaging very low in grade.

The porphyry mine of the Boston Consolidated is opened by 15 tunnels with about 10 miles of workings and consists of 110 acres of mineralized monzonite-porphyry, a continuation of the porphyry orebody of the

Utah Copper Co. Opencast work of the Boston Consolidated was by 21 terraces, cut in the sides of the mountain.

The porphyry ores of the Boston Consolidated gave decidedly disappointing results in initial production, the upper portion of the ore deposit showing a considerable excess of iron, and the porphyry ores treated for the first half of 1908 gave concentrates ranging 14 to 19% copper and about 25% iron, with a final smelter recovery of only 19 to 22 lbs. fine copper per ton. It soon became obvious that the Boston Consolidated property could be handled to materially better advantage as a part of the Utah Copper Co. than was possible as an independent unit.

The Utah Copper Co.'s opencut workings are on a truly colossal scale. The porphyry orebody lies mainly on the southern side of a mountain, of which practically the entire face, of about 2,000' height, is being removed, the first 110' or so from surface as capping and an average of about 424' following as ore. Notches are cut along the mountainside for successive lines of railway track, and, as the rock is removed, these notches become broad terraces, that cut deeply into the flank of the mountain. The work of ore breaking and removal is done by powerful movable machinery, the nature of the orebody and the method of its mining precluding the use of any machinery except that capable of moving on a railroad track. Equipment of the opencast mine, at the end of 1912, included 22 Marion and Vulcan steam shovels, of 70 to 90 tons weight each, 36 standard-gauge locomotives, 11 narrow-gauge locomotives, 100 standard-gauge dump cars of 12 cu. yds. capacity each, 117 standard-gauge dump cars of 6 cu. yds. and 144 narrow-gauge dump cars of 4 cu. yds. capacity each. The rock is broken by blasting, before removal by steam shovels, holes being bored by churn drills and blasted in sections averaging 40' thick, 60' deep and 1,000' long, each section or bench containing about 180,000 tons of ore, requiring about 25 tons of dynamite for its blasting; a single blast has sometimes broken down as much as 15,000 tons of ore. As already stated the total cost of mining is about 41 cts. per ton, but excluding stripping and development work, the actual cost of drilling, blasting and loading into the railway cars is about 25 cts. per ton.

Stripping the orebody was begun, with steam shovels, Aug., 1906, and is still in progress. As cost of underground mining is about 4 times that of open work, it will be discontinued entirely if conditions permit and the stripping is far enough advanced. The removal and disposal of the overburden is a great task in itself; the capping of waste rock loaded into cars by steam shovels, and dumped at different points down the canyon on lands bought for the purpose. There are 30.2 miles of standard-gauge track in and around the mines, 5.16 miles of narrow-gauge and 2.26 of 3-rail track, a total of 37.62 miles, all owned by the Bingham & Garfield R. R. Co.

Mining equipment includes steam plants at both the Utah and Boston mines, but extensive use is made of electric power, received from the Utah Power & Light Co. There are 6 air compressors, having a combined capacity of about 8,000' of free air per minute, but the mines have a minimum equipment of fixed mining machinery, for the reason before given. Buildings at the mine include machine and carpenter shops, smithies, and minor structures.

The Bingham & Garfield Railway Co., organized July, 1908, under laws of Utah, has a capitalization of \$2,500,000, shares \$100 par, and is controlled by the Utah Copper Co., through ownership of the entire share capital. There is a \$2,500,000 issue of 10-year 6% bonds, convertible into stock of the Utah Copper Co. at \$50 per share, at any time after July 1, 1914, of which \$337,000 had been retired, March, 1913, through sinking

fund. The main line from Garfield to the mines, including track to the smelter and the Carr Fork extension to the Apex yard, is about 26 miles in length. Yard and side tracks along the line aggregate about 34 miles, and track rights, at Bingham, on other lines, total 37.6 miles, giving a grand total of about 97.6 miles of track. The average grade for the entire line is about 2%, but there is a maximum grade of 2.5% for 14 miles. There are 4 tunnels, all driven 18' wide and 22' high, the longest being 2,079', with an aggregate length of 4,795'. There are 3 steel viaducts, spanning the canyons at a great height, the longest, across Carr Fork, being 690' long and 190' high. Equipment of the line includes 4 Mallet articulated compound locomotives, each weighing 230 tons, on the driving wheels; 2 switching locomotives, each weighing 61 tons; 6 switching locomotives, weighing 78 tons; 423 hopper bottom steel cars; 75 steel concentrate cars; 10 wooden cars; 6 flat cars; 4 cabooses; 3 passenger coaches; 2 tool cars, and one 120-ton wrecking crane. The hopper-bottom steel ore cars are of 60 tons nominal capacity, with 10% excess allowance for overload. The cost of the complete line was upwards of \$5,000,000. The railway was opened Oct., 1911.

The company has had 3 mills, one at Bingham Canyon, now dismantled, and 2 at Garfield, 20 miles from the mines. The 900-ton Copper-ton mill at Bingham Canyon, the first concentrator put up by the company, is fully described in Vol. VIII. It was closed permanently Aug. 1, 1910, and all machinery that was suitable was sent to the Arthur mill for remodeling that plant.

The finely disseminated copper glance necessitates fine crushing with the formation of slimes and a tailings loss of $\frac{1}{2}$ to $\frac{3}{4}$ % copper. Concentration is about 23 into 1.

The Magna mill, the first mill built at Garfield, stands on a 3,000-acre site, 4 miles E. of the Garfield smelter and 1 mile E. of the Arthur mill. It is connected with the mines by the Bingham & Garfield, Denver & Rio Grande and San Pedro, Los Angeles & Salt Lake railways. The building 505x600' is of steel frame, on concrete foundations, with reinforced concrete floors, iron siding and composition roofing. It contains two 3,000-ton units each of 6 sections, each unit being 300x505' in size, the 2 units, with their outlying buildings and yards, occupying a site of about 20 acres. The plant is so designed that 2 additional units of the same size can be added when desired. Milling was begun June, 1907, with 2 sections, and the 12th and final section of the mill started work Nov., 1908.

The ore bins of the Magna mill are of 38,000 tons aggregate capacity, with bins of 25,000 tons capacity in the coarse-crushing department, and 13,000-ton bins in the fine-crushing department.

The Magna mill is divided, longitudinally, into 3 departments, for coarse crushing, fine crushing and concentrating. Each of the 2 coarse-crushing sections of the mill has two No. 7½ Gates gyratory crushers and 4 sets of 54x20" roughing rolls of special design. The fine-crushing department for the entire mill contains 36 six-foot Chilean mills, and 24 sets of 15x37½" rolls, with necessary feeders, 24 elevators and 48 impact screens. The concentrating department for the entire plant is built on 3 floors, 1 above the other, having respective areas of 120x600', 164x600' and 120x600'. In this department there are 41 Wilfley tables, 1,104 six-foot vanners of suspended type, 81 Richards-Janney classifiers, and 388 nine-foot conical settling tanks. The Magna mill made a saving of 66.03% of assay values from ores averaging only 1.36% copper in 1912. The average extraction of both mills was 66.3% in 1912. The Magna mill handles 12,000 tons daily.

The Arthur mill, about 1 mile W. of the Magna mill, built by the Boston Consolidated Mining Co., at a cost of upwards of \$1,500,000, was remodeled and enlarged to a capacity of 10,000 tons of ore daily. The mill, as built, was in six 500-ton units, with 13 operating units, 370x555' in size, of steel and concrete construction. There are 9,000-ton ore bins in the coarse-crushing department, and 12,500-ton bins in the fine-crushing department. The coarse-crushing department is a separate building, 35x74' in size, the ore bins taking up 300' of the length of this building, the remainder being used for crushing. In remodeling the Arthur mill, the Nissen stamps were replaced by Chilean mills and other machinery installed to correspond to the practice at the Magna mill. This includes 4 sets of 72x20" rolls, 20 sets of 15x37" rolls, 26 six-foot Chilean mills, all of special design; 78 impact screens, of 3x4' size; 26 steel apron orefeeders, of 30" size; 52 four-compartment, 54 five-compartment, 39 three-compartment, and 2 six-compartment Richards-Janney mechanical classifiers; 156 Garfield roughing tables of 4x12' size and 26 of 6x12' size; 34 No. 5 Wilfley tables; 832 six-foot vanners, and 312 nine-foot dewatering cone tanks. Electric power, used throughout, is taken from the Utah Power & Light Co.

The 13,000-h. p. steam-electric plant, 2,000' E. of the Magna mill, is in a 158x288' building, of steel frame, erected by the Minneapolis Steel & Machinery Co. The boiler plant has 20 Heine 419-h. p. water-tube boilers, working under 175 lbs. steam pressure, equipped with American automatic stokers, having separate mechanical drives, of special design. There are two 26x50x48" Allis-Chalmers cross-compound Corliss condensing engines direct-connected to two 1,500-kw. a. c. generators, and three 32x70x48" Nordberg cross-compound Corliss condensing engines direct-connected to three 2,250-kw. a. c. generators. There are 2 concrete smokestacks, 180' high, 12' inside diameter at the top.

The pumping plant of the Magna mill includes a Nordberg triple-expansion condensing pump having 42x22x59" cylinders, and plunger 16" in diameter, with a common stroke of 52", of capacity to force 10,000 gals. of water per minute, from a pond on the mill site, through 1,900' of 24" pipe, against a head of 230', to a 3,500,000-gal. concrete-lined reservoir above the mill. The original pumping plant, held in reserve for emergencies, consists of one 12" two-stage turbine pump, direct-connected to a 250-h. p. General Electric induction motors, with capacity to lift 2,500 gals. per minute under the same service conditions as the main plant, one 12" two-stage turbine pump direct-connected to a 350-h. p. General Electric induction motor, with capacity of 3,500 gals. per minute, and one 15" two-stage turbine pump, direct connected to a 450-h. p. induction motor, with a capacity of 4,500 gals. per minute, giving a total capacity of 10,500 gals. per minute for the auxiliary plant, or 20,500 gals. per minute for both plants, jointly. An auxiliary pumping plant, back of the Magna mill consists of two 8" Worthington single-stage pumps direct-connected to induction motors, with combined capacity to raise 3,000 gals. of water per minute to a 500,000-gal. high-service concrete reservoir 100' above the main reservoir.

Water for the Arthur mill is developed partly from springs on the mill site, and is taken partly from the Magna reservoir. The pumping plant of the Arthur mill consists of one 3,000-gal. rotary pump, direct-connected to a 400-h. p. Westinghouse induction motor, and two 1,500-gal. rotary pumps, direct-connected to two 250-h. p. Westinghouse induction motors. Water is pumped from a pond on low ground, below the mill, through 4,000' of 20" wood-stave pipe, to a concrete-lined reservoir of 2,000,000 gals. capacity,

against a static head of 350'. There is a 1,500,000-gal. clay-lined reservoir, 40' above the main reservoir, for fire protection.

Miscellaneous buildings at the Magna mill consist of a 56x105' machine shop, of steel frame, with brick walls, on concrete foundations, thoroughly equipped for all repair work, a 48x72' carpenter shop, a 52x100' warehouse, and an office. Buildings at the Arthur mill, all of steel and concrete, include a 50x180' machine shop, 80x160' foundry, a 40x40' carpenter shop, and a smithy.

The Utah Copper Co. employs 3,500 men, 1,900 at the mines, and 1,600 at the mills and shops at Garfield.

Mining costs for 1912 were 42.33 cts. per ton of ore, including 12.01 cts. for stripping and general development costs. Milling costs for 1912 averaged 41.53 cts. per ton, giving a total cost of 83.91 cts. for mining and milling, but not including cost of transportation, which presumably was 28 cts. per ton, giving a total estimated cost of \$1.123 per ton. The ore treated 1912, averaged 1.346% copper, with an extraction of 66.32% giving a net recovery, in the form of concentrates, of 18.09 lbs. of finished copper per ton, at a cost of almost exactly 6.2 cts. per lb. of copper, in concentrate unsmelted. The total mining and milling cost for 1912 was 2.56 cts. less than in 1911. The following figures of cost of finished copper are net, after deduction of included gold and silver values: 8.787 cts. in 1909, 8.069 cts. in 1910, 7.865 cts. in 1911, and 9.024 cts. in 1912. The high cost in the latter year was due to the disturbed labor conditions and the strike during the last quarter of the year. In the months of July and August, preceding the strike, the plants treated an average of 19,616 tons of ore per day, containing 1.42% copper, with costs averaging 6.89 cts. per lb.

Production of the Boston Consolidated Mining Co. was 3,223,836 lbs. fine copper in 1904; 3,565,483 lbs. in 1906; 6,146,125 lbs. copper, 78,128 oz. silver and 12,446 oz. gold in 1907; 6,148,512 lbs. copper, 49,130 oz. silver and 7,446 oz. gold in 1908.

Production of the Utah Copper Co. was 5,473,469 lbs. copper in 1905; 4,698,906 lbs. in 1906; 43,689,875 lbs. in 1908; 51,749,233 lbs. in 1909; 85,644,511 lbs. in 1910; 98,436,224 lbs. in 1911; 91,366,337 lbs. in 1912, and 87,957,421 in the 9 months ended Sept. 30, 1913. With the remodeling of the mills completed, the company now has a productive capacity of not less than 150,000,000 lbs. of finished copper yearly, while the ore reserves are so enormous that a productive capacity of 24,000 tons of ore daily, the maximum amount that the mills can handle, is by no means the limit of output of the mines. The company's copper is marketed through the American Smelting & Refining Co., on a 1% commission basis.

It is obvious that while the Utah Copper Co. has not reached the 7 ct. cost originally predicted by the management, it has demonstrated its ability to make copper under 10 cts. per lb., which is somewhat lower average than that of the 10 largest producers of the world. The ore reserves of the mine are as long lived as those of any mine in the world. The management is entitled to the credit of making the Utah the pioneer among the so-called porphyry mines, a magnificent success, in the face of very considerable obstacles, despite a vast amount of skepticism and criticism on the part of mining men and the general public.

UTAH & EASTERN COPPER CO.

UTAH

Office: 127 Church St., New Haven, Conn. Operating office: 508 McCormick Bldg., Salt Lake City, Utah. Mine office: Dixie, Washington Co., Utah. Works office: Shem, Washington Co., Utah. Louis E. Stoddard, pres.; T. W. Farnam, sec.-treas.; Chas. H. Doolittle, gen. mgr., at last accounts. Organized 1901, under laws of West Virginia, capitalization \$1,500,-

000, increased later to \$3,500,000, shares \$5 par, in \$2,000,000 preferred and \$1,500,000 common stock.

Lands, 11 claims, patented, 220 acres, and a 40-acre smelter site, including the old Dixie mine, in the Tutsagubet or Cave Springs district, near Green river, showing 5 replacement deposits in limestone, 1 of 40' estimated average width, carrying cuprite, azurite and massive malachite ores, said to give average assays of 15% copper. Principal development was by a 775' blind shaft, sunk from the breast of a 225' tunnel. This tunnel caved, 1905, and it was necessary to run a new tunnel, of 800', to reopen the mine. Old workings said to show about 100,000 tons of ore. Equipment includes a small gasoline plant.

The company has 2 smelters, 1 worthless; the new smelter has a 100-ton water-jacket blast furnace, with water power, secured from the Santa Clara river, 2 miles distant, and a small auxiliary steam plant. The smelter is at Shem, about 50 miles from Acoma, on the Rio Grande Western railroad, the nearest shipping point, and transportation for 14 miles of the distance is by traction engine.

Production was 1,448,597 lbs. copper in 1904, 400,166 in 1905, and 391,779 lbs. in 1907. Property considered promising but is handicapped by lack of rail transportation. Idle since 1907.

UTAH GOLD MOUNTAIN MINING CO.

COLORADO & UTAH

Presumably idle. Mine office: Marysvale, Piute Co., Utah. Letter unclaimed at former mine office, Telluride, San Miguel Co., Colo. Organized 1906, under laws of Utah, capitalization \$4,500,000, shares \$1 par, as a merger of the Log Cabin Gold & Copper Co., Ltd., and the Gold Development Co. Lands, 67 claims, 1,300 acres, 12 miles W. of Marysvale, in the Mount Baldy district, said to have 3 tunnels, with about 3,000' of workings. Claims reported to show a vein carrying ore of good average assay value.

UTAH LEAD & COPPER CO.

UTAH

Office: Kearns Bldg., Salt Lake City, Utah. Mine office: Bingham Canyon, Utah. W. D. Bohm, manager. Organized Dec. 24, 1912, under laws of Maine, as the successor of the Bingham Copper Co., capitalization \$500,000, shares \$1 par. Debentures \$100,000, at 6%, convertible bonds.

Lands, 11 claims, patented, about 125 acres, on the eastern slope of Carr Fork canyon. Company also owns a one-quarter interest in the Diamond Extension and a one-half interest in the Diamond claims adjoining.

The property shows 3 fissure veins, several bedded deposits of silver-lead ore and a fissure vein of copper ore of less promise. A big outcropping near the W. end line is said to have yielded considerable high-grade gold and silver ore with lead carbonates, to former owner.

The mine is opened by 2 tunnels, longest 1,200', and 2 shafts on the Venice claim. There are about 3,000' of workings, showing ore below commercial tenor generally but with occasional streaks of ore assaying up to 70% lead and 15 to 30 oz. silver. Equipment includes a small air compressor.

UTAH METAL MINING CO.

UTAH

Office: Tooele, Utah. E. P. Jennings, pres.; W. E. L. Dillaway, treas. and chairman executive committee; other directors, H. P. Clark, A. B. Martin, M. A. Taylor, W. M. Wadden, J. E. Rothwell, C. J. Morse and H. L. Ayer; H. D. Kinney, mgr.; Ralph E. Parker, sec.

Organized June 8, 1909, under laws of Maine, capitalization \$7,500,000, shares \$5 par. Debentures, \$375,000, 6% convertible bonds, maturing April 1, 1916. Company is a consolidation of the Bingham Central Mining Co., Bingham Standard Copper Co. and Bingham Metal Mining Co. State Street Trust Co., Boston, registrar; Commonwealth Trust Co., Boston, transfer agent.

Lands, about 3,400 acres, including mineral lands and 139 acres of timber tracts, with a mill site, and water right estimated as capable of developing 1,000 h. p. Company's holdings extend from Carr Fork gulch, in Bingham canyon, over the divide of the Oquirrh range into Middle canyon, Tooele county, Utah. The Middle canyon lands show a limestone belt similar to that on the Bingham side of the divide. The Tooele lands in Middle canyon, have 5 tunnels, No. 1 of 5,000', No. 4 of 1,700' and No. 5 of 500' in length, at last accounts. It is thought that the cupriferous porphyry of Bingham canyon may extend to this property.

The Carr Fork property, in the Bingham Canyon district, adjoins the Boston Consolidated, Utah Consolidated and Bingham-New Haven properties, and includes the Bingham Central and Bingham Standard groups which carry the Saginaw, Burning Moscow and Nast vein systems, each traceable for a distance of about 4,500', and all intersected by the Old Jordan fault. The property also carries several smaller veins having lead ores.

The Bingham Standard lands are opened by the Saginaw tunnel, and the mine is said to have produced \$600,000 worth of ore under a former management.

The Bingham Central group comprises 190 acres, patented, developed by 2 tunnels, with about 9,000' of workings.

The Whiteley or upper tunnel of about 2,000' length, shows mainly silver-lead ore, and has about 500' to drive to reach the main orebodies, which should be tapped at depth of about 450' below the Deems tunnel. The Jeff Davis or lower tunnel of about 2,000' length, cut at about 800' distance from the portal, a vein of sulphide ore carrying about 2% copper, with small gold and silver values, and at a distance of 1,700', cut a silver-lead vein of 2 to 8' width, carrying a considerable percentage of shipping ore, with copper values of 2 to 5%. In 1908, this tunnel opened 2 new orebodies, one, of 3 to 4' width, carrying 12% copper ore, the other being a vein of silver-lead ore.

The Amelia tunnel, with portal about 175' vertically above the Jeff Davis tunnel, develops a lode about 75' wide, which carries low-grade concentrating ore, said to average about 2.5% copper and \$1.50 gold per ton, with small silver values, for 90' in length. The Deems tunnel, driven from Log Fork, is an old working, about 400' long, showing a strong vein carrying some good ore. The Saginaw tunnel, of about 700' length, is a drift for 400', on a strong fissure vein, showing a paystreak of 1 to 12' width, from which considerable ore shipments have been made. The Mountain Maid tunnel of the Bingham Central-Standard group is about 950' in length.

The Utah Metal Co.'s tunnel, also known as Tunnel No. 1, 11,494' in length, driven from the Tooele side, cuts entirely through the mountain, and ending in Carr Fork, gives a back of about 2,300' vertically at its deepest point under the Ridge claim, developing orebodies about 900' below the deepest workings of the Bingham Central-Standard group. The tunnel is 8x9' in the clear, with a grade of 0.5%, carrying double-tracks laid with 35-lb. steel rails. By cutting entirely through the mountain this tunnel affords direct connection and transportation facilities between the Bingham camp and the Tooele smelter, cutting a number of orebodies at great depth, and also developing a considerable water power, the flow of water being about 600,000 gals. per day. A contract with the Utah Copper Co. disposes of a minimum amount of 300,000 gals. daily, and negotiations for the sale of the balance are in progress.

No. 2 tunnel is located about 1 mile down the canyon from No. 1 and is 800' lower, vertically.

The property includes a mill site in Middle canyon, near the mouth of

No. 1 tunnel, about 4 miles from the International smelter. Enough water has been developed for a 500-ton mill, while further water supply can be obtained from springs on the opposite side of Middle canyon.

Equipment includes small mining plants at the various properties. The main power plant, near the portal of the big tunnel, in Middle canyon, has 20, 60 and 125-h. p. direct-connected Pelton water wheels, and management plans installing heavy electrical equipment, ultimately. The plant includes a generator, an Ingersoll-Rand air compressor and a small electric light plant.

The Utah Metal Mining Co., has ambitious plans, a large acreage of land, including a number of properties of merit, and the management is entitled to credit for its wisdom in devoting its efforts entirely to the completion of its great drainage and transportation tunnel, rather than scattering its work over a number of different properties. Development work is now in progress.

UTAH MINING, MILLING & TRANSPORTATION CO. UTAH

Letters unclaimed at former office, Boston, Mass. Mine address: Moscow, via Milford, Beaver Co., Utah. Chas. T. Birchard, pres. and gen. mgr.; John Thompson, mgr. Lands include the Hub and Lady Bryan mines, latter bought 1909, of Mathew Cullen et al., S. of the Burning Moscow, 6 miles from a railway, in the Star district. The property is opened by a 400' two-compartment main shaft, developing a vein variously reported as 2 to 30' in width, carrying silver-lead carbonates, and a bedded deposit in limestone showing high-grade cuprite, from which small shipments of ore of 10 to 12% copper have been made. Equipment includes gasoline power, with a hoist and air compressor. Was developing with small force, at last reports.

UTAH-NEVADA DEVELOPMENT CO. NEVADA & UTAH

Idle. Office: 333 Judge Bldg., Salt Lake City, Utah. Mine office: Lofgreen, Tooele Co., Utah. Letter unclaimed at former office, Black Horse, White Pine Co., Nev. Leslie L. Savage, pres.; H. B. Lamb, vice-pres.; J. A. Foley, sec.-treas. Capitalization \$100,000, shares \$1 par. The company is said also to have lands in the Gold Circle district of Elko county, Nev. The principal property is in the West Tintic district, near Lofgreen, where the company is said to have a 100-ton concentrator.

UTAH ORE SAMPLING CO. UTAH

Office: Provo, Utah. Jesse Knight, pres.; E. P. Ellison, vice-pres.; Arthur Stallings, sec.; A. W. Gates, gen. mgr.; preceding officers, W. L. Mangum and J. W. Knight, directors; W. E. Evans, supt. at Murray; F. Burgner, supt. at Silver City, Utah; M. A. Snow, supt. at Park City, Utah. Capitalization \$200,000.

Company owns and operates ore-sampling mills at Murray, Park City, Silver City and Sandy, with combined capacity of about 500,000 tons of ore annually.

UTAH-RELIANCE MINING CO. UTAH

Office: 408 South State St., Salt Lake City, Utah. Mine office: Ibapah, Tooele Co., Utah. J. G. Bywater, pres.; D. B. Tripp, vice-pres.; Richard B. Shepard, sec.-treas. and gen. mgr.; preceding officers, W. A. Langford and Samuel Divett, directors. Organized 1908, under laws of Utah, capitalization \$5,000, shares 1 ct. par, assessable; issued, \$3,000, fully paid.

Lands, 8 claims, unpatented, 160 acres, about 45 miles from a railway, showing porphyry and limestone. Development is by a 175' tunnel and a 100' shaft, latter showing ore assaying up to 16% copper, 4 oz. silver and 40 cts. gold per ton.

UTAH-UNITED COPPER CO. UTAH

Office: 222 D. F. Walker Bldg., Salt Lake City, Utah. Mine office: Mil-

ford, Beaver Co., Utah. A. J. McMullen, pres., treas. and gen. mgr.; J. E. Edmunds, vice-pres.; Chas. A. Weaver, sec.; preceding officers, Arthur B. Gatrell, T. M. Farrell and R. H. Greenledge, directors; D. P. Rohlfing, engr. Organized Oct. 1, 1908, under laws of Utah, as a merger of the Wasatch Mining & Milling Co. and Skylark Copper Mining & Milling Co., capitalization \$600,000, shares \$1 par, assessable; issued, \$150,000, with \$30,909.11 assessments levied to March, 1913. Annual meeting, second Tuesday in October.

Property, 21 claims, 1 fractional, 2 patented, a 10-acre mill site and a patented water right, including the Skylark and O. K. groups, in the Beaver Lake district, 6 miles from a railway and 12 miles W. of Milford. Claims show limestone, monzonite and granite cut by fissure veins and carrying contact deposits between monzonite and limestone. One vein reported to average 20' in width, is opened by 5 shafts, deepest 470', another of 385', others, 100', 150' and 25', and by several tunnels, longest 250'. The management reports 2,399' of workings which are estimated to expose 70,000 tons of ore with 20,000 tons blocked out for stoping. This ore is reported to average 2% copper and to carry small silver, gold and lead values. The ore minerals include cuprite, melaconite and azurite together with chalcopyrite and marcasite in a ferruginous gangue.

Equipment includes 25-h. p. hoist and 3 buildings.

UTAH-YERINGTON MINING CO.

NEVADA

Office: Provo, Utah. John Roundy, pres.; C. W. Reese, vice-pres.; Heber C. Jex, sec.-treas.; Jos. Harris and Jos. Wirthlin, directors. Organized 1907, under laws of Utah, capitalization \$100,000, shares 10 cts. par. Property, 13 claims, lying E. of the Mason Valley mine, and next to the Butte-Yerington Copper Co. are said to show 8 exposures of copper ore.

Mine is being worked by leasors and was said, early 1913, to be yielding a small quantity of copper, lead and silver ore.

UTE COPPER CO.

UTAH

Office: 306 Dooley Bldg., Salt Lake City, Utah. Mine office: Bingham Canyon, Salt Lake Co., Utah. Thos. Weir, pres.; John Weir, Jr., vice-pres.; J. M. Burt, sec.-treas.; Henry Catrow and N. J. Catrow, directors. Organized May, 1907, under laws of Utah, capitalization \$3,000,000, shares \$5 par.

Lands were 225 acres, patented, but the company lost 3 claims to the Bingham-Amalgamated Mining Co., 1910, after litigation. Property includes the old Winnimuck mine, which was an important silver-lead producer in early days. Development is by the 900' Weir tunnel, and through the tunnel of the Bingham-Butte Mining Co. Equipment includes an old concentrator of 150 tons daily capacity, which has been leased to Werner Ziegler, and the company is inactive.

UTE GOLD & COPPER CO.

COLORADO

Mine office: Cortez, Montezuma Co., Colo. Edward J. Kelley, supt., at last accounts. No trace of recent operations securable.

UTELAND MINING CO.

UTAH

Office: Heber, Utah. Mine office: Uteland, Uinta Co., Utah. Geo. F. Timm, pres. and gen. mgr.; Chas. Lehman, vice-pres.; W. K. Barton, sec.; O. McCammon, treas.; preceding officers, A. M. Legg, H. B. F. Heath, Chas. Timm, and A. C. Hatch, directors. Organized Oct. 11, 1905, under laws of Utah, capitalization \$1,000, shares \$10 par, increased Nov. 7, 1905, to \$4,000,000, shares \$1 par, fully paid and all issued.

Property, 213 acres, owned in fee and about 20 claims, unpatented, including a 5-acre mill site, 7 miles from Ouray, in the extreme eastern part of the Uintah Indian Reservation, formerly held by the Florence Mining Co. Claims show impregnations in sandstone along favorable beds, forming

blanket veins that outcrop in bold, cliff faces. The ores give assays of about 7% copper, 2 to 5 oz. silver and \$1 to \$2.50 gold per ton. The ore contains malachite and a little chalcopryrite, but sulphide ore is found only in small quantities.

Development is practically all superficial, owing to the nature of the deposit. Equipment includes a 50-ton leaching plant built at a reputed cost of \$40,000. Property now idle, but management plans to resume operations early in 1914.

UTICA MINING & MILLING CO.

COLORADO

Idle. Office: 1420 Chestnut St., Philadelphia, Pa. Mine office: Ward, Boulder Co., Colo. G. A. Davison, superintendent. Ores carry gold, silver and copper. Has water power and a 20-stamp mill. No returns securable.

UTOPIA MINING & MILLING CO.

WYOMING

Office and mine: Centennial, Albany Co., Wyo. Lee Van Voorhis, pres.; Jas. McCune, vice-pres.; P. L. Holtum, sec.; P. H. Milburn, treas.; Bernard Holtum, gen. mgr. Organized, 1898, under laws of Wyoming, capitalization \$1,000,000, shares \$1 par, nonassessable; issued, \$875,000. Annual meeting, third Tuesday in August.

Lands, 2 claims, 30 acres, unpatented, in the Centennial district. The property shows 2 contact veins between diorite and schist, of which 1 averaging 6' in width, is reported to have given assays of 3% copper, 4 to 20% zinc, up to 63 oz. silver and \$44 gold per ton. Ore minerals are mainly chalcopryrite, sphalerite, and pyrites.

The mine has tunnels of 250', 600', 175', 300', and 1,200', with about 2,600' of workings, all in ore.

Equipment includes a small electrical installation, with electric drill, and 6 buildings. Company was developing with a small force, early 1913.

VALENCIANA MINING CO.

MEXICO

Mine office: Matehuala, San Luis Potosi, Mex. Zeferino Salazar, manager. Lands, 9 groups, 60 hectares, including La Valenciana mine at Hacienda de Vanegas, near Matehuala, developed to depth of about 60 meters, carrying silver-copper carbonates, from which a small production has been secured. Also owns La Independencia mine, 38 hectares, near Concepcion del Oro, Zacatecas, Mexico.

VALENSUELLA COPPER CO.

ARIZONA

Office: Terre Haute, Ind. Mine office: Bouse, Yuma Co., Ariz. David L. Watson, pres. and gen. mgr.; Geo. C. Foulkes, sec.; F. W. Deidesheimer, treas., at last accounts. Organized 1901, under laws of Arizona, capitalization \$1,250,000, shares \$1 par.

Lands, 7 claims, patented, about 100 acres, and a 60-acre mill and smelter site, 12 miles S. W. of Quartzite. Property shows limestone and schist, carrying 2 contact deposits. The main contact of 12' estimated average width, is developed by shafts of 270' and 890', latter an incline, with upwards of 1,300' of workings, showing malachite, azurite and copper oxides, said to give a general average assay of 12% copper, 4 oz. silver and \$1.50 gold per ton. Equipment includes gasoline power, 2 hoists, 2 engine houses, smithy and 6 dwellings. Water is supplied by a 1,000' artesian well. There is a 40-ton Vulcan blast furnace, of small present value. Probably idle.

VALENSUELLA COPPER MINING CO.

ARIZONA

Office and mine: Benson, Cochise Co., Ariz. Organized 1907. Lands, about 25 miles N. W. of Benson, near the San Domingo mine of the Hub Mining & Investment Co., are said to show extensive outcrops of self-fluxing copper ore. • Idle several years.

VALERIE MINE.

YUKON

Letter unclaimed at former office, Vancouver, B. C. Mine office: White

Horse, Yukon, Canada. Arthur D. Palmer, owner; Arthur Thompson, manager, at last accounts. Lands, 1 claim, 50 acres, 3 miles S. E. of the Arctic Chief mine, and about 6 miles S. of White Horse, connected by a 2½-mile wagon road with Wigan station, on the White Pass railway. The property shows a contact metamorphic deposit said to average 18' wide lying between limestone and granite. The deposit shows oxidized ores in numerous outcrops underlain by chalcopryite ore holding arsenopyrite, estimated to average about 10% copper. A little stripping has been done and there is an incline shaft of 92' and 2 shafts of 20', with several hundred feet of workings. A 40-ton test shipment of high-grade chalcopryite ore, 1904, gave smelter returns of 18% copper and \$5 gold per ton. Equipment includes a 20-h. p. boiler and an 8-h. p. hoist.

VALLEY VIEW MINING CO.

CALIFORNIA

Idle. Mine office: Lincoln, Placer Co., Cal. W. B. Hellings, manager, at last accounts. Lands, 90 acres, patented, showing a zone up to 250' in width, between schistose walls, covered by a gossan outcrop of about 100' width, traceable 1,000', carrying gold and silver values estimated to average \$4 per ton; the gossan was worked some years for gold. The ore deposit has a 5 to 30' paystreak, carrying copper and zinc sulphides, from which ore was shipped that averaged about 5% copper. Equipment includes two 5' Huntington mills. Idle several years.

VALPARAISO MINE.

MONTANA

Office: Corbin, Jefferson Co., Mont. C. O. Matson, owner. Lands, 8 claims, well timbered, on Valparaiso creek, are developed by 3 tunnels of 1,000', 450' and 200', and a 75' shaft, showing 2 veins of 14 to 16' width, carrying ores said to average 3 to 6% copper, 15 to 25 oz. silver and \$4 to \$8 gold per ton. Presumably idle.

VAN ANDA COP. & GOLD MINES CO., LTD.

BRITISH COLUMBIA

Letter unclaimed at former office, 108 La Salle St., Chicago, Ill. Mine office: Van Anda, Texada Island, B. C. H. W. Treat, gen. mgr. and L. Goodacre, trustees; Jas. Raper, agt., at last accounts.

Lands, 20 claims, crown granted, 840 acres, including the Copper Queen and formerly the Cornell mines, and a town site, on Marble bay. The company has been bankrupt for years, but kept alive by Mr. Treat, and has been bonded from time to time to various operators who have held the property for short periods only.

The mines have lenses of rich ore, mainly bornite, with some chalcopryite, carrying small gold and silver values with garnetiferous and calcareous gangue, but the lenses are neither large nor continuous and have not proven profitable under operation. Ores produced have ranged in tenor up to 8% copper, 2.5 oz. silver and \$1 gold per ton. The Copper Queen mine has a 500' main shaft with a 180' winze. There are other shafts of 80' and 150', and tunnels of about 4,000' aggregate length, the mines as a whole having about 2½ miles of workings.

Equipment includes small steam plants, with 25-h. p. and 35-h. p. hoists and a 5-drill Rand air compressor. The mines have a warehouse and shipping wharf, and there is a 20,000' sawmill.

The reduction plant includes a small sampling mill and a small and obsolete smelter, 1 mile from the mine, connected therewith by tram.

VANCOUVER ISLAND MG. & DEV. CO., LTD.

BRITISH COLUMBIA

Office: 45 Leadenhall St., London, E. C., Eng. Mine address: Duncans, Vancouver Island, B. C. F. H. Faviell, chairman; F. J. Lawrence, secretary. Organized Nov. 18, 1902, under laws of Great Britain, capitalization £50,000, shares £1 par; issued, £36,195. Lands, about 1,800 acres, patented, lying mainly E. of the Tyee mine and supposedly carrying the eastern extension

of the Tyee vein. The Westholm has a 510' two-compartment shaft, 700' W. of known occurrence of ore in the Tyee, and has about one-half mile of workings, showing on the 500' level a wide mineralized zone with occasional ore concentrations of 3 to 10% copper tenor. The Blue Bell has a 110' shaft, showing a little copper ore. Company has done no mining or prospecting in several years, and, at last accounts was engaged in lumbering.

VANGUARD GOLD-COPPER CO.**OREGON**

Mine office: Kerby, Josephine Co., Ore. C. E. Phillips, manager. Organized 1910, capitalization \$1,000,000, shares \$1 par. Lands, 7 miles W. of Kerby, are said to carry gold-copper ore. Was developing with small force at last accounts.

VEKOL MINING CO.**ARIZONA**

Office: Tucson, Ariz. Mine office: Vekol, Pinal Co., Ariz. Maj. E. S. Garnett, pres.; J. V. Neuhaus, vice-pres.; S. J. Garnett, sec.; J. M. Cotton, treas., at last accounts.

Lands, 42 claims, about 6 miles W. of the Reward mine and 35 miles S. W. of Casa Grande, in the Vekol mountains. Property includes 6 old mines, dating from 1881, said to have produced in the past nearly \$3,000,000 worth of silver-lead ore. The old mines shipped some ore carrying up to 400 oz. silver per ton with considerable lead and a small amount of copper. Development is by a 380' two-compartment main shaft, the mines having about 6 miles of old workings, developing a deposit of complex sulphide ore containing lead, copper and zinc, with indications of increased copper values at depth.

Equipment includes a steam and electric plant, with an air compressor and 3 hoists, 1 good for 1,000' depth. Buildings include a smithy, machine and carpenter shops, office and laboratory. The mill, of 40 tons rated daily capacity, has 10 stamps. Probably idle.

VEKOL RANGE COPPER CO.**ARIZONA**

Letters unclaimed at former offices, Security Bldg., Los Angeles, Cal., and Winkelman, Gila Co., Ariz. Chas. E. Finney, pres.; Edw. W. Brooks, vice-pres. and cons. engr.; Robt. J. Simpson, sec.-treas., at last accounts. Organized July 21, 1910, under laws of Arizona, capitalization \$3,000,000, shares \$10 par, in 25,000 shares preferred and 275,000 shares common stock.

Lands, 53 claims, 2 patented, 1,000 acres, 25 miles S. of Casa Grande, including about 200 acres of supposed porphyry copper ore. Mine has a 600' main tunnel and the 350' Phonodoree shaft, with about 2,000' of workings. The mine has been a small producer in former years. Equipment includes an antiquated smelter. Inactive.

VENTURE HILL MINING CO.**ARIZONA**

Office: 1515 Shatto St., Los Angeles, Cal. Jas. G. Scarborough, pres.; Mrs. Carrie G. Taylor, vice-pres.; Wm. R. Uber, sec.-treas. Organized 1900, under laws of Arizona, capitalization \$3,000,000, shares \$1 par. Lands, 6 patented claims, 110 acres, 2 miles S. of Jerome, show 2 fissure veins, claimed to average 4.7% copper, 6.5 oz. silver and \$4 gold per ton, in oxide and sulphide ores, developed by shafts of 65' and 87' and tunnels of 205' and 457'. Idle since 1904, and out of funds.

VERDE APEX COPPER MINING CO.**ARIZONA**

Office: 3 West Main St., Bloomsburg, Pa. Mine near Jerome, Yavapai Co., Ariz. Chas. B. Lutz, pres. and treas.; Jas. H. Mercer, vice-pres.; M. P. Lutz, sec. Organized 1900, capitalization \$3,000,000, shares \$1 par. Property was sold by the sheriff 1906, but was redeemed by the president for benefit of shareholders. Lands, 6 claims, about 90 acres, in Mescal gulch, about 2 miles S. of Jerome, slightly developed by 2 tunnels and shaft. Idle since 1904, and moribund.

VERDE COPPER MINING CO.**ARIZONA**

Letter unclaimed at former office: 167 Dearborn St., Chicago, Ill. Mine office: Jerome, Yavapai Co., Ariz. W. P. Cooper, pres.; E. C. Weatherley, vice-pres.; John Tierney, gen. mgr.; J. J. O'Donohue, sec.-treas.; J. P. Mowles, supt., at last accounts. Organized Jan., 1904, under laws of Arizona, capitalization \$3,000,000, shares \$1 par, as North Verde Copper Co., and name changed, Jan., 1909, to present title.

Lands, 6 claims, 120 acres, near the United Verde, cover a shear zone showing iron-stained rock and ledge matter, with calcite, that is about 150' wide. This mineralized zone has been prospected by a 375' shaft and a 250' tunnel. The latter shows a very little ore carrying 2.5% copper and 3 oz. silver per ton and a trace of gold. Equipment includes a 70-h. p. boiler, 40-h. p. Fairbanks-Morse double-cylinder hoist and an air compressor. Lands were jumped, Jan., 1908, but company claimed that assessment work was done properly, and jumping illegal, and apparently won out on this contention. Idle, except for a few weeks, since 1907. No returns secured.

VERDE GRANDE COPPER CO.**ARIZONA**

Office and mine: Jerome, Yavapai Co., Ariz. J. C. Scott, pres. and mgr.; J. W. Hubbard, vice-pres.; C. M. Heim, sec.-treas.; preceding officers, J. N. Lyons and J. W. Radley, directors. Organized Sept., 1906, under laws of Arizona, capitalization \$8,000,000, shares \$1 par; issued, \$5,700,000. Company endeavored, Aug., 1910, to float a \$20,000 bond issue, among its shareholders, but only \$2,000 was subscribed, which was returned, but in a second attempt, made 1912, about \$5,000 was raised for which 3-year bonds, at 6% were issued. Annual meeting, second Tuesday in December.

Lands, 9 claims, patents pending, 125 acres, on the southern slope of Smelter hill, the United Verde being on the opposite slope, about a mile distant, lands being located on a precipitous hill. The property shows diabase, diorite, slate and schist, carrying stringers of argentiferous and auriferous azurite, chalcocite and chalcopyrite, of good assay tenor, but not in commercial quantities, occurring mainly in schist. The management believes that the lands carry an extension of the United Verde orebody. Development is by an 800' shaft and 3 tunnels, with about 2,000' of workings.

Equipment includes a steam plant, with a 60-h. p. hoist, good for 1,500' depth, and an 8-drill Ingersoll-Rand air compressor. There are 8 buildings, including a 40x44' power house, 12x18' carpenter shop and 12x14' smithy, with a bunk house and mess house. The present management is endeavoring to raise funds to extend a 560' crosscut to intersect a mineralized ledge that gives indications of carrying ore at depth.

VERDE MINING CO., LTD.**IDAHO**

Mine office: Osburn, Shoshone Co., Idaho. L. J. LePage, pres.; J. E. Lefever, vice-pres.; W. G. Lefever, treas., at last accounts. Organized Sept., 1906, capitalization \$1,000,000, shares \$1 par. Lands, 12 claims, in McFarren gulch, 3 miles from Osburn, adjoining the Gray on the S. W. Has a shaft and tunnel showing ore assaying up to 6% copper, 11% lead and 25 oz. silver per ton. Idle several years, and dormant, if not defunct.

VERDE QUEEN MINING CO.**ARIZONA**

Mine office: Pantano, Pima Co., Ariz. P. M. Hilton, superintendent, at last accounts. Lands, in northern end of Helvetia district, about 12 miles from Pantano, and 15 miles W. of Benson, show silver-lead and copper ores, developed by a 2-compartment shaft, from which a little lead ore was shipped to the Deming smelter. Equipment includes steam power. Presumably idle.

VERMONT COPPER CO.**VERMONT**

Office: 576 Fifth Ave., New York. Mine office: South Strafford,

Orange Co., Vt. G. E. Parks, sec.; G. M. Heckscher, mgr.; Chas. Of, supt. Organized 1906, under laws of Arizona, as successor of Elizabeth Copper Co., capitalization \$1,000,000, and since has taken over the Strafford Mining Co. and the Sharon Power Co.

Lands, 12 miles from Pompanoosue, the nearest rail station, include the old Elizabeth mine, opened 1793, for magnetic pyrites, and operated early in the nineteenth century by the Vermont Copperas Co., which is said to have made, at one time about 6,000,000 lbs. of copper yearly, beginning a small incidental production of copper about 1830, when it was found that the mine carried an average of about 3% copper, in the form of chalcopyrite disseminated in pyrrhotite.

The orebody is a thin lens of pyritic ore in foliated mica-schist, wedging out at the bottom. The lens has been mined for 700' in length and is reported, by the management to have been opened up for more than 2,000' in length, ranging from 50 to 100' in width, of which 8 to 10' is ore. Management estimates upwards of 1,000,000 tons of pyritic ore in sight, consisting of pyrrhotite and pyrite with small amounts of chalcopyrite. Diamond-drill borings, made 1909, have shown ore to continue for 200' depth below the present workings. The mine has a 1,340' tunnel with back of 225', and a 200' incline blind shaft. The dumps carry about 50,000 tons of discarded ore of which large portions are estimated by the management to average 1.75% copper.

A hydro-electric power station on the White river, equipped for 500 h. p., and formerly transmitted current 9 miles to the mine and works. There also is a small steam plant and an air compressor at the mine.

The reduction plant at the mine included a mill and smelter, the former using the Rowland magnetic separation process. The smelter has a 300-ton blast furnace in which semi-pyritic smelting was tried, but abandoned 1908, for heap roasting. The smelter is idle, pending the construction of an acid plant, planned by the management. Idle and unlikely to be reopened.

VESUVIUS MINES CO.

OREGON

Frank J. Hand, superintendent, Bohemia, Lane Co., Ore. Property, the Vesuvius group of claims, shows veins with gold-silver-copper ores. Equipment includes water, steam and electric power and 10-stamp mill. Company plans erecting concentrator in 1913-14.

VICEROY MINING CO.

ARIZONA

Office: Janesville, Wis. Mine near Patagonia, Santa Cruz Co., Ariz. Frank H. Baack, pres.; M. G. Jeffris, vice-pres.; M. O. Mouat, sec.-treas. Organized Oct., 1912, capitalization \$1,000,000, shares \$1 par, nonassessable; issued, \$600,000.

Lands, 8 claims, unpatented, 164 acres, in the Tyndall district, 20 miles N., N. W. of Patagonia.

The property shows a number of fissure veins, traversing porphyry or following contacts between diorite and porphyry and dipping 45°. The vein is said to range from 6 to 75' in width. Ores are principally silver-bearing, but show occasional bornite and a little lead ore above the water level, reported to carry from 16 to 199 oz. silver per ton.

Development is by shafts of 40' and 100' with about 400' of workings in leached ore.

Idle since April, 1913, for lack of funds, but company was planning to resume operations early in 1914.

VICTOR & BELLE CROWN MINING CO.

ARIZONA

Office and mine: Wenden, Yuma Co., Ariz. J. E. Matteson, pres. and gen. mgr.; F. C. Piper, vice-pres.; J. H. Matteson, sec.-treas.; B. J. Quinn, cons. engr.; preceding officers, R. R. MacDonald, W. E. Enos and J. M.

Shaffert, directors. Lands, 10 claims, 180 acres, in the Harcúvar mountains, 8 miles N. of Salome, the nearest rail point. Claims are said to have a vein of 5 to 7' width, a 30 to 36" paystreak, giving assays of 15 to 20% copper and \$15 to \$20 gold per ton. Development includes shafts of 80', 35' and 450', and tunnels of 755', 165' and 230' aggregating about 1,200' of workings. Equipment includes gasoline power.

VICTOR CONSOLIDATED MINING CO.

UTAH

Office: 53 City and County Bldg., Salt Lake City, Utah. Mine office: Eureka, Juab Co., Utah. J. S. Wills, pres.; J. A. Groesbeck, sec.; Vivian McCune, gen. mgr., at last accounts. Organized under laws of Utah, capitalization \$375,000, shares 50 cts. par, assessable, with 5 assessments levied and fully paid. Lands, 5 claims, patented, including the Victor and Boss Tweed mines, carrying gold and silver bearing copper ore, developed to depth of 800'. The company is idle and the mine has been in the hands of leasers since 1909.

VICTOR MINING & SMELTING CO.

MEXICO

Office: 315 Schultz Bldg., Columbus, Ohio. Mine address: Cananea, Sonora, Mex. S. D. L. Jackson, pres.; M. F. Cole, vice-pres.; F. P. Jackson, sec.-treas.; preceding officers, J. S. MacLean, W. H. Sartain, C. Thornton, Chas. Schindler and C. A. Stillwagen, directors; W. A. Woodlief, fiscal agt.

Organized May 9, 1905, under laws of Arizona, capitalization \$1,000,000, increased 1907, to \$1,500,000, shares \$10 par; issued, 90,000 shares. Title to property is held through the Guerrero Mining Co., legalized in Mexico. Annual meeting, second Monday in January.

Lands, 47 pertenencias, in 2 groups in the Magdalena district, about 12 miles S. W. of Cananea. The property shows fissure veins in granite-porphry intruding sedimentary rocks. The veins are strong and well defined, very silicious and high in iron content.

Development is by a shallow shaft and 5 short tunnels, with a total of about 1,500' of workings, showing high-grade copper ore with small gold and silver values, in 2 veins of about 4' and 70' width, the wider vein showing evidences of considerable leaching. A test shipment of ore, made 1912, yielded 13.56% copper and 80 cts. gold per ton.

The mine has no power equipment, but a steam plant, with hoist, power drills and a motor truck are to be purchased with money derived from the sale of treasury stock, late 1913.

VICTORIA CONSOLIDATED MINING CO.

UTAH

Office: care A. F. Carden, 406 Dooley Blk., Salt Lake City, Utah. Mine at Eureka, Tintic district, Juab Co., Utah. Lafayette Holbrook, pres.; Hon. Reed Smoot, vice-pres.; J. C. Lynch, mgr.; J. R. Twelves, sec.-treas., Provo. Capitalization \$70,000, shares 10 cts. par; \$50,000 issued. Has paid \$202,500 dividends to date, and \$10,000 in 1912.

Property, the Victoria mine at Eureka. Ore is silver-lead with some copper occurring in fissure replacements in limestone. Copper, though present, is in too small an amount to be paid for by smelters. Like other Tintic mines, it is likely to develop copper ores.

Development includes 1,200' shaft with 2,500' of workings and 1,500', 200 and 300' tunnels. Has new compressor, installed 1913, and uses electric power.

VICTORIA COPPER MINING CO.

MICHIGAN

Office: 60 Congress St., Boston, Mass. Mine office: Victoria, Ontonagon Co., Mich. Fred H. Williams, pres.; Chas. D. Hanchette, vice-pres.; Jas. P. Graves, treas.; preceding officers, Willard S. Martin and A. W. Chesterton, directors; Sydney S. Millett, sec. and transfer agt.; Geo Hooper, gen.

mng.; C. E. Weed, mine supt.; Chas. Caddo, mill supt.; G. A. Braun, Jr., engr.; A. R. Penberthy, clerk and purch. agt.

Organized Jan. 16, 1899, under laws of Michigan, capitalization \$2,500,000, shares \$25 par; paid in, \$14. Last assessment was \$1, Aug. 21, 1911. Company ended 1912, with quick assets of \$27,623.58, and with 1,155 shareholders. Shares listed on the Boston Stock Exchange. First National Bank, Boston, registrar. Annual meeting, fourth Monday in February.

Property comprises 2,289 acres mining lands, 6 non-mineral, in Secs. 19, 20, 29, 30 and 31, T. 50 N., R. 39 W., and Secs. 24, 25 and 36, T. 50 N., R. 40 W. This tract has an extreme E.-W. width of 2 miles, and a N.-S. length of $2\frac{3}{4}$ miles, lying just W. of the Ontonagon river. It is practically all on the mineral belt, only about 100 acres lying on the eastern sandstone. The tract may carry the western extension of the amygdaloidal bed under development by the Lake Copper Co. Neighboring mines, all idle for many years, are the West Minnesota on the N., National on the E. and Tremont-Devon on the W. The lands are well timbered, with an inexhaustible supply of good sandstone for building purposes. Nearest railroad is the Chicago, Milwaukee & St. Paul, at Rockland, 3 miles distant.

The first known attempt at Lake Superior copper mining was made in the winter of 1770-71, on what is now Victoria property. The next work was done in 1849, when the property was opened under the name of Cushin, on a line of prehistoric pits containing masses of native copper, 1 weighing upwards of a ton. The name was changed 1850, to Forrest, and the property was reorganized 1858, as the Victoria Mining Co. Under these titles the property made 373,279 lbs. fine copper at a loss of about \$180,000. The mine was operated regularly, on a small scale, 1849-55, and thereafter spasmodically. It was unwatered 1883, but remained idle until work was begun March 1, 1899, by the present company.

The mine is located on a high and steep hill, notwithstanding which the solid rock is covered with heavy sand and clay drift. The Forrest amygdaloid bed, on which the mine is opened, is 5 to 80' wide, averaging about 12', but of very irregular width and dip, and very buncy in contents. The average strike is N. 66° E., and dip 61° N. W., the lode having about $1\frac{1}{2}$ miles of outcrop on Victoria lands. The formation is much disturbed at surface, the bed being irregular in dip, but widening at depth, with more regular walls. The lode is low in average grade, but fairly regular in copper contents, carrying low-grade stamp rock, with best values near the hanging wall.

The old mine was opened by 5 shafts, numbered E. to W., located at irregular intervals, with levels spaced at 55 to 65'. No. 1, a single compartment shaft, was 244' deep; No. 2, with 2 compartment, 247' W. of No. 1, was 246' deep; No. 3 with 1 compartment, 258' W. of No. 2 was 300' deep; No. 4 with 1 compartment, 310' W. of No. 3, was 130' deep; No. 5 with 1 compartment, 578' W. of No. 4, was 60' deep. The old mine has about 4,000' of laterals.

No. 2 shaft, which was chosen for new operations, was enlarged to 2 compartments, 8x12' inside measurement, and is 2,250' deep, bottomed just below the 24th level. Levels below the 4th have been opened at regular intervals of 100', with drifting on all levels. The total drifting on the Forrest bed, tributary to No. 2 shaft, was 31,362' at the end of 1912, and in addition there are 7,212' of crosscuts, the longest being 2,117' on the 19th level S. Short drifts have been opened from these crosscuts on various beds, but without much encouragement. The total openings tributary to No. 2 shaft are 42,631', and the mine was estimated, 1912, to show 300,000 tons of stamp rock, with 200,000 tons blocked out for stoping.

The productive part of the mine tributary to Victoria or No. 2 shaft, on the Forrest bed, develops an epidotal amygdaloid having an average width of 4 to 12', widening to 80', at one point in the bottom workings. Walls are quite regular, but where crush zones occur, the mineralization extends into the walls, giving an occasional maximum of 50' width of ore. The footwall bed underlying the Forrest, at a depth of 2 to 12', is also well mineralized in places, carrying occasional masses from 100 lbs. to 3 or 4 tons in weight, but is very bunched, copper occurring mainly on the foot, with considerable epidote on the hanging. Underlying this epidotal bed, at a distance of 60', is a 6' amygdaloid showing much epidote and allied minerals, with a little stamp rock. Stopes have been opened on all levels from the 4th to the 22nd inclusive, with fairly uniform results.

The copper shoot developed by this shaft is 1,000 to 1,500' wide, with a slight rake to the S. W. The ore stope is low in average grade, but fairly regular in contents, with main values in stamp copper. All levels down to the 17th are connected by winzes, giving ventilation and safety. The walls stand well, without timber, excepting shafts and along the levels. New openings 1912, were 4,128' of drifts, 504' of crosscuts, 98' of raises and 141' of sinking, giving a total of 4,871' of new openings for the year, and 6,448 cubic fathoms stoped. The mine works 35 power drills.

An exploratory shaft, 2,600' E. of No. 2, was sunk, 1907-08. to depth of 121', with some drifting and crosscutting, which met with small encouragement, and work was stopped.

No. 6 shaft, 3,455' E. of No. 2, was started Dec., 1909, to develop the eastern end of the property, previously explored by diamond-drill borings. This shaft, 7x15' 6" in dimensions, has 3 compartments, with 2 skipways, designed for 6-ton skips, and concrete and steel construction are used wherever possible, the usual method of concrete stringer construction having been modified by covering the entire footwall with concrete, in which are imbedded light timber stringers on which the rails are set. This shaft was 886' deep, Dec., 1913, with stations cut at 105', 263', 363', 450', 550', 650', 750' and 850', and 1,490' of drifts and crosscuts, showing broken and faulted ground, quite barren of copper, excepting for about 100', a short distance W. of the shaft.

The mine also has a 724' crosscut tunnel driven into the bluff overlooking the river, showing the contact between the Keweenaw trap beds and the eastern sandstone, with several amygdaloidal beds exposed on which 176' of drifting gave a little encouragement. There also are old crosscut tunnels of 150' and 419'.

Considerable diamond drilling has been done N. of the Forrest bed, a total of 15,292' of holes having been drilled, in 2 cross-sections, disclosing several beds that may warrant future attention.

No. 2 shaft has a 30x50' frame shaft house, on stone foundations, equipped with a pneumatic hoist and a 5-ton traveling crane for handling skips, man cage and timber. The rock house, in connection with the shaft house, is 37x40' in size, of wood, on concrete piers, having storage bins for both stamp rock and waste, with chutes, loading gates and air lifts, and there is a pneumatic hammer for mass copper. The skip dumps into a large storage bin, from which rock is fed by gravity to 18x24" and 13x18" crushers that discharge into bins, from which the rock is loaded into 6-ton railway cars.

The power house is equipped with a 20x48" Webster, Camp & Lane duplex-cylinder hoist, having a single conical drum of 8' minimum and 12' maximum diameter with 11' face, carrying 3,000' of 1½" rope, raising 4-ton skips, and equipped with an automatic safety stop and throttle-closing device. The

boiler house is for heating purposes only. Buildings at No. 2 shaft include machine and carpenter shops, smithy, changing house, hospital, warehouse, general store, mine office, mining captain's office, 3-story frame boarding house and 76 dwellings, the company owning upwards of 100 buildings. A 10x16x28' storage cistern holds water from the mine for feeding boilers. Water for domestic use and fire protection is pumped from a well having a storage tank about one-half mile from the mine. A sawmill having a 50" circular saw furnishes timber and lumber, having sawed 212,446' of lumber in 1911 and 355,118' in 1912. A lathe, shingle and planing mill were erected in 1912.

Equipment at No. 6 shaft includes a shaft house, an engine house having a 12x20" Nordberg geared hoist with a cylindrical drum, of 5' diameter and 8' face, which formerly was at No. 2 shaft, and with which No. 2 was sunk to a depth of 2,089', though the hoist was rated at only 1,200' capacity.

A large water power has been developed from Glenn falls, on the W. branch of the Ontonagon river, about 1 mile from the mine, at a cost of \$440,593, to Dec. 31, 1912. This is the best natural water power of the Lake Superior copper district, the stream dropping about 110' on the company's property, by a series of small falls, between which are numerous rapids, with sandstone bottoms. The company utilizes 72' of this drop. Power is developed by means of a dam, canal and shafts.

The dam, built up on excavated bedrock, is 225' between abutments, and has 32 eighteen-inch I-beams, 10' apart, sunk vertically 5 to 10' in bedrock, with cement filling. It has an extreme height of 24', is 14' wide at the bottom and 8' at the top, and has a 320' main section with wings of 100' and 160', giving a total length of 580', built with an arch up-stream. The dam is faced, on the water side, with 5x10' plates of 3/16" steel, bolted to the steel I-beams through the concrete. The center of the dam has an apron 80' wide, also a floating boom to guide logs, as the stream is used for logging operations, and is substantially built, so that it cannot be torn out by a log jam. The dam is provided with two 44" flush gates, for drainage and flushing out silt, a log chute, waste weir and sand fence. There are 6 canal head gates in 2 sets, in a frame of 20" I-beams, set vertically, 6' apart, with 6 heavy oak gates, worked vertically by rack and pinion, the gates being 6' wide in the clear.

The canal diverting water from the dam is 4,800' long, the first 4,000' being earthwork, with 20' base and side slopes of 1½:1. The depth is 10' at the head gates, with a bottom slope of 1" in 100'. The last 800' is cut through sandstone, rectangular in section, with a 14' base and depth of 14'. At the end the canal opens out in a forebay, at the extreme end of which the compressor shafts are located. The canal is equipped with drainage gates, slush gates, overflow weirs and submerged measurement gates.

The 3 intake shafts of the compressor are 5' in diameter, spaced 19' from center to center. The shafts were sunk through solid sandstone, by means of 5" preliminary holes, bored to the required depth of 343', then enlarged from 5" to 5' in diameter.

The shafts, formerly lined throughout with concrete, drew air through 5,000 special ⅜" tubes. This proved unnecessary as the water falling down each shaft sucks air with it and this air is carried through a 360' tunnel at the bottom of the shaft to a large chamber cut in the rock. A water seal at the intake end is formed by ⅜" steel shells, firmly concreted into the bottom of the shafts. The air chamber is 281' 6" long, and 18' wide, with minimum of 21' and maximum of 26' height, having a maximum capacity for 80,264 cu. ft. of compressed air. The water seal at the upflow end is formed by an arch of rock, 40' long, below which a tunnel 10' high leads to the up-

flow shaft, which is 16x18' in section, sunk at 72°, with a vertical depth of 271', leading to surface, where the water is again discharged into the river. The power head developed is 72', and the pressure head 271', giving a maximum air compression of 117 lbs. per sq. inch. Imprisoned air, carried down the shafts by suction and swept along the tunnel in bubbles, by the rushing water, is released in the chamber where the constant accession of bubbles, causes compression, escape backwards being prevented by the falling water in the shafts. The chamber, known as the compressor, is connected with a 12" pipe line to mine and mill. Extra pressure is relieved by a safety or blow-off pipe.

The Taylor hydraulic-pneumatic plant was completed, May, 1906, and began furnishing 4,000 to 5,000 h. p. under a full head of water, and has shown an efficiency of 82% under test. This plant is the largest single-unit air compressor in existence, and the fifth installation of the sort in the world. It is possible to operate 1, 2 or 3 of the inlet shafts, if so desired, with corresponding variation of the energy developed, but only 1 unit is in regular use. The compression is automatic, practically isothermal, and the air as delivered is unusually dry.

An extensive topographical and hydraulic survey of the company's lands and the watershed made 1909, by the J. G. White Co., of New York, shows that an average of 15,000 h. p. can be developed on the western branch of the Ontonagon river, but the expense of development necessarily will be large. During the drought of 1910, the water supply fell far below normal and additional storage for water was secured on the western branch of the Ontonagon river, near the outlet of Lake Gogebic. Ultimately the Victoria will have 8,000 to 12,000 h. p. of electric energy for sale, and a transmission line to Houghton and Calumet would give access to a market where this amount of power would be readily salable, though there is a much nearer market in the Lake district of Ontonagon county.

The mine and mill are connected by a 4,800' tram line, in 2 sections, the upper with 6%, and the lower with a 12% grade. A stationary double-sheave hoist, at the top of the incline, serves to pull the empty cars up the steeper grades, but otherwise trains are operated by gravity, in counterbalance. A compressed air locomotive switches trains of four 6-ton cars from the head of the incline to and from the No. 2 rock house.

The stampmill, on the bank of the river, near the hydraulic works, has a single 24x24" Allis-Cuyahoga stamp. The stamp, of 650 tons daily capacity, has $\frac{3}{8}$ " mortar screens, and all-oversize above 5/16" is run to a set of 16x36" Traylor rolls. The washing floor contains 22 Hodge jigs, 5 Wilfley tables, 6 Card tables, 1 Standard table, hydraulic separators and settling tanks. Machinery is driven by a 12x12" piston-valve engine. The mill went into commission June, 1906, tailing losses running only 0.1 to 0.15% copper. Mineral (concentrate) is smelted by the Calumet & Hecla Co.

Production has been as follows: 1906, 546,334 lbs. copper; 1907, 1,207,237; 1908, 1,290,040; 1909, 1,062,218; 1910, 1,164,564; 1911, 1,303,331; 1912, 1,224,911.

Tonnage costs are low, but finished copper costs are high, owing to the exceedingly low average tenor of the rock stamped which was only 0.63%, or 12.7 lbs. of finished copper per ton, secured at a cost of 15.8 cts. per lb. in 1907, with a cost of 14.34 cts. per lb. in 1908, and 13.67 cts. per lb. in 1909, in which year unusually heavy expenditures were made for new construction and extensive exploratory work. The rock continues painfully low in grade, and averaged a recovery of only about 9 lbs. fine copper per ton in 1910, 10 lbs. in 1911 and 9.3 lbs. in 1912. These returns would be absolutely ruinous, and the mine hopeless, were it not for the great advantage that the property enjoys through the cheapest power that is had by any copper mine in

this or any other district. Cost per ton of rock stamped was \$1.56 in 1908; \$1.48 in 1909, \$1.17 in 1910, \$1.19 in 1911 and \$1.32 in 1912. It is obvious that the Victoria needs 15-cent copper to break even on its present basis of production, but could a larger ore supply be secured, by enlarging No. 2 shaft, even the present phenomenally low average cost could be lowered, and the Victoria is in a position, if given a larger tonnage of rock to stamp, to handle rock of lower average grade than perhaps any other mine in the Lake Superior district. The company's holdings are extensive, exploratory work is being conducted with vigor, and the management has displayed both courage and good judgment in its operations.

VICTORIA MINE.**MONTANA**

Mine address: Troy, Lincoln Co., Mont. Frederick Lang, manager. Property, in the Sylvanite district, 24 miles N. of Troy, on the Yahk river, is developed by an 800' tunnel showing gold and silver-bearing copper sulphides.

VICTORY COPPER MINING CO.**ALASKA**

Inactive. Office: 817 Alaska Bldg., Seattle, Wash. Mine office: Ketchikan, Gravina island, Alaska. M. McTernan, pres.; E. D. Fisher, vice-pres.; Maurice D. Leehey, sec.; J. R. Kelley, treas. Dr. C. O'Connor, C. J. Cronin and E. F. Tiernan, directors; Patrick Heaney, gen. mgr. Organized March, 1901, under laws of Washington, capitalization \$1,500,000, shares \$1 par, non-assessable; fully issued. Annual meeting, first Monday in September.

Property, 14 claims, 9 patented, 260 acres, on Seal bay, Gravina island, 22 miles S. of Ketchikan. The claims extend from sea level to 4,000' above the beach. Lands show granite, greenstone and limestone reported to be cut by 11 veins, of which 4 were developed. The main vein is estimated by management to average 22' in width carrying chalcopryrite with quartz gangue and to assay about 5% copper, 19% sulphur, 19% iron and 52% silica, with \$2 per ton in combined gold and silver values. Development is by a 2,100' tunnel, started just above sea level, intersecting 11 veins.

VIENNA-INTERNATIONAL MINE.**IDAHO**

Mine address: Wallace, Idaho. Property, near the mouth of Flora gulch, on Placer creek, 2 miles S. of Wallace, shows banded shales and quartzites of the middle part of the Newland formation, striking N. 50 to 60° W., and dipping 70° S. Principal vein has a quartz-siderite orebody, 3 to 5' wide with strike almost E.-W. and vertical dip. Ore on the dump shows galena, pyrite and chalcopryrite in a quartz-siderite gangue of too poor a grade to be profitably concentrated.

Development is by a shaft, and 2 tunnels of 700'.

VILLAGE BELLE GOLD & COPPER CO.**COLORADO**

Office and mine: Walden, Larimer Co., Colo. David Hendrickson, pres. and gen. mgr.; M. C. Ward, vice-pres.; T. John Payne, sec.-treas., at last accounts. Organized July 16, 1902, under laws of Wyoming, capitalization \$100,000, shares \$1 par. Lands, 4 claims, unpatented, are said to have an 8' vein carrying ore that will average 15% copper and 7 oz. silver per ton. Development consists of a 100' shaft with a 150' drift, at last accounts. Equipment includes a 20-h. p. steam plant, and the mine has a small concentrating mill. Idle.

VINCENT CREEK GOLD & COPPER CO.**OREGON**

Office and mine: Austin, Grant Co., Ore. Burton Miller, pres. and gen. mgr.; W. H. Miller, vice-pres.; Nellie H. Miller, sec.-treas.; other directors, J. S. Edwards, J. McHenry and E. Blackwell. Organized Dec. 5, 1907, under laws of Oregon, capitalization \$1,000,000, shares \$1 par; issued 500,014 shares.

Lands, 80 acres, in the Greenhorn district, 30 miles from a railway.

Property shows a strong vein, traceable 1,500', said to average 14' in width and 3.5% copper. Development consists of a 25' shaft and a tunnel planned to be driven 600' with back of 400'. There are 3 buildings. Mine has no power equipment.

VIRGIN COPPER CO.

PENNSYLVANIA

Office: 12 West Bldg., York, Pa. Mine office: Charmian, Franklin Co., Pa. John H. Dechert, pres.; Chas. E. Wills, vice-pres. and gen. mgr.; Clarence A. Wills, sec.; Harry S. Wiest, treas. Lands, about 1 mile N. of Charmian, in the Blue Ridge mountains, near the Maryland state line, show ore carrying native copper, with silver and gold values said to give assays of \$25 to \$600 per ton. Development is by a 215' shaft sunk at 47°, and 4 diamond drill holes, of 165 to 800', were bored, 1907. Equipment includes a small hoist and air compressor. Is considered an unpromising venture.

VIRGINIA COPPER MINE.

VIRGINIA

Office: care Richard Lamb, 136 Liberty St., New York. Mine address: High Hill, Halifax Co., Va. Property is the High Hill mine, 1,617 acres, in the Virgilina district, developed by 8 shafts of 140 to 300' depth, with about 1 mile of workings. Property shows 2 veins giving assays up to 5.9% copper, 2 oz. silver and 80 cts. gold per ton. Ores are highly silicious, the gangue containing about 87% silica, which precludes smelting and wet process concentrating, but Mr. Lamb advises 1913, that he has perfected a leaching process and expects to again have the mines in operation. Property was formerly operated by the Virginia Copper Co., Ltd. Equipment includes a 350-h. p. steam plant.

VIRGINIA COPPER M., M. & SMELTING CO.

MEXICO

Letter unclaimed at former office, 16 North Eighth St., St. Louis, Mo. Mine office: Concheño, Chihuahua, Mex. J. W. Clayton, president and manager. Organized under laws of Arizona, capitalization \$1,250,000, shares \$1 par.

Lands, S. of Temósachic, 75 miles from a railway, include the Hidalgo mine, having 4 tunnels, developing a vein of 8' reported width, which in the Santiago tunnel shows sulphide ores giving assays of 22.12 to 42.73% copper, 7.6 to 13 oz. silver and up to 40 cts. gold per ton. A carload test shipment, 1909, to the Torreón smelter is said to have returned 33% copper, 15 oz. silver and 0.32 oz. gold per ton. Equipment includes steam power, with hoist and air compressor.

VIRGINIA DEVELOPMENT CO.

MEXICO

Office: Douglas, Ariz. Mine address: Fronteras, Sonora, Mex. W. B. McBride, pres.; S. Grose, mgr., at last accounts. Lands, 19 hectares, near the Cabullona mine, 16 miles S. of Douglas, have a shallow 2-compartment shaft, said to show native copper and mixed carbonates, giving average assays of 26% copper, 30 oz. silver and \$4.96 gold per ton. Idle.

VIRGINIA MINING CO.

IDAHO

Idle. Office: 123 Atlas Blk., Salt Lake City, Utah. Mine near Baker, Lemhi Co., Idaho. M. B. Sowles, pres.; J. D. Pardee, vice-pres.; W. A. Byers, sec.-treas. and gen. mgr. Organized 1904, under laws of Arizona, capitalization \$1,000,000, shares \$1 par.

Lands, 15 claims, 9 patented, 300 acres, in the Sand Creek district, 5 miles from a railroad, show slate, granite and porphyry, with 8 fissure veins, said to average 2' in width and to be traceable 6,000', carrying chalcopryrite and galena, assaying up to 7% copper, 2 oz. silver and \$25 gold per ton. Mine is reported to have 3,000' of workings, with 10,000 tons of ore in sight. Equipment includes a 3-stamp mill.

VIRGINIA SMELTING CO.

VIRGINIA

Secretary's address: 131 State St., Boston, Mass. Works office: West

Norfolk, Norfolk Co., Va. W. E. C. Eustis, pres.; A. H. Eustis, vice-pres.; F. A. Eustis, sec.-treas.; E. H. Hamilton, supt. Organized Nov. 10, 1909, under laws of Maine, as successor of Eustis Smelting Works, capitalization \$1,000,000, shares \$100 par, nonassessable, in \$500,000 preferred and \$500,000 common stock. Annual meeting, first Tuesday in October.

Company owns the Eustis Smelting Works, or Norfolk smelter, located on tide water, near Norfolk, with railroad facilities to all points. The location is favorable for custom smelting, as more coal is shipped out from this vicinity than from any other center in North America and this traffic commands favorable freight rates on return cargoes. The location also insures the best coke for metallurgical use, on advantageous terms. Ore received by vessel is unloaded by machinery into standard railway cars, with facilities to set aside any desired portion into a sample car, standing on a separate track. The unloader has a maximum capacity of 1,000 tons in 24 hours. Railroad cars containing ore, whether from the wharf or direct rail shipments, are hauled by locomotives upon trestles, whence ore and coke are dumped into storage bins having capacity for 25,000 tons of ore, and, if necessary, the works can store 50,000 tons of ore.

The smelter has a single water-jacket blast furnace, 4x36' at the tuyeres, of 600 tons daily capacity, using sea water for the jackets. The plant does a general custom business, treating ores from Sherbrooke, Quebec, and ores from El Cobre mine of the Cuba Copper Co., the iron in the Sherbrooke ore fluxing the silicious Cuban ores. The works have steam, electric and pneumatic power. A Dwight-Lloyd sintering plant was installed 1912, and the management contemplates the addition of calciners. Owners are reported to have considered adding a chamber acid plant.

VIRTUE MINING & DEVELOPMENT CO.

ARIZONA

Office: Paradise, Ariz. Mine office: Portal, Cochise Co., Ariz. E. F. Epley, pres. and gen. mgr.; W. T. Epley, vice-pres.; Geo. A. Walker, sec.-treas. Organized July 14, 1906, under laws of Arizona, capitalization \$1,000,000, shares \$2 par, nonassessable; issued \$780,000. Promoters were given \$600,000 for the property.

Lands, 8 claims, unpatented, 160 acres, in the California district, showing 2 ore deposits, 1 of which is claimed to be 100' wide. The main ore-body is a contact deposit carrying irregular pockets of ore, chiefly chalcocite and chalcopyrite, with some oxidized ore, giving assays of from a trace to 58% copper, from a trace to 28 oz. of silver, with traces of gold. Development is by a number of pits, of 10 to 26' and the Virtue tunnel, planned to be driven about 1,100', to cut the vein giving a back of about 600'. There is no power equipment.

VOLCANCILLOS MINES.

MEXICO

Mine office: Avenida Borbon No. 6, Autlan, Jalisco, Mex. Carolina Blake, manager. Property, 28 pertenencias, 70 acres, and a 10-acre mill site, with 100 sq. miles of timber lands, held under a government concession in the Cacoma district, including the Volcancillos and adjoining mines. The Volcancillos group, 12 miles W. of Autlan, shows diorite-porphry dikes, with contact deposits 5 to 80' wide, the largest one containing chalcopyrite ore assaying 4 to 15% copper, 4 oz. silver and nearly \$5 gold per ton.

Development includes a 300' two-compartment shaft with about 1,000' of workings and several tunnels, 1 having a back of about 150' but still in the oxidized zone. The mine is estimated by the management to show about 100,000 tons of ore. The ore deposit, discovered 1860, was opened by Edward Blake, was operated under bond and lease for a while by the

Cacoma Mining & Smelting Co., but reverted to Mr. Blake and still remains in his family.

Equipment includes a steam plant with 40-h. p. hoist, good for 1,000' and a 10-ton mill and smelter, now abandoned. The ore from the Volcanillos is sold to the local Indians, who have been metal workers from time immemorial. The natives buy the crude ore, paying 4 cts. per lb. for the copper content. They crush and concentrate the ore, smelting the concentrate in little furnaces and making copper cakes which are skillfully fashioned into pots, kettles and other articles.

VOLCANIC MINE.

BRITISH COLUMBIA

Mine office: Grand Forks, Boundary district, B. C. R. A. Brown, owner. Lands, 102 acres, and a 320-acre mill site, on the north fork of the Kettle river, show a great hill of cupriferous pyrrhotite. Vein, claimed to be 1,200' long, shows small values in copper and gold near surface, with promise of better values at depth. Has a 900' tunnel, which has not yet reached the orebody. Property, though low in grade, is considered promising, because of vast size of its orebody. There are a number of small buildings, including a boarding house for 40 men.

VOLUNTEER MINING CO.

UTAH

Office: 232 D. F. Walker Bldg., Salt Lake City, Utah. Mine address: Milford, Beaver Co., Utah. W. C. Albertson, pres. and gen. mgr.; W. H. Havenor, vice-pres.; S. G. Cole, sec.; H. E. Havenor, treas., asst. sec. and engr.; preceding officers and Geo. Havercamp, directors. Organized under laws of Utah, capitalization \$50,000, shares 10 cts. par, nonassessable; issued \$25,550. Annual meeting, second Monday in May.

Property, 6 claims, unpatented, 600 acres, in the North Star district, 7 miles from the S. P. L. A. & S. L. R. R. The claims show contact deposits between limestone and intrusive porphyry. The mine has only two 12' pits, and a 70' tunnel, which is to be continued.

VULCAN COPPER MINING CO.

CALIFORNIA

Office: 625 Market St., San Francisco, Cal. Letter unclaimed at former mine office: Kennett, Shasta Co., Cal. John R. Lyle, pres. and gen. mgr.; E. G. Humphrey, vice-pres.; Alton J. Knight, sec.-treas., at last accounts. Organized Oct. 18, 1905, under laws of Oklahoma, capitalization \$3,500,000, shares \$1 par. Company was selling stock 1910, at 25 cts. per share flat, or at 50 cts. per share with a guarantee of money back in 10 years.

Property, the Great Verde mine, 14 claims, patented, 250 acres, adjoining the Balaklala and Shasta King mines on the W., lands being on Squaw creek, about 10 miles from Kennett. Claims show alaskite porphyry and andesite with gossan croppings, 1 covering an orebody, claimed to be 80' wide, of ore containing chalcopyrite, disseminated in pyrite, estimated by management to average 3.5% copper, 2 oz. silver and \$3 gold per ton, which figures seem too high.

Development includes numerous short tunnels, 4 showing low-grade ore, near surface, with about one-half mile of workings. Property is claimed to show occasional native copper and chalcopyrite ore up to 20% copper. Diamond drilling is said to have developed good sulphide ore. Probably idle.

VULCAN MINING, SMELTING & REFINING CO.

NEVADA

Mine office: Cherry Creek, White Pine Co., Nev. J. H. Leishman, manager. Capitalization 2,500,000 shares. Lands, partly patented, in the Hunter district, about 30 miles from Ely, the nearest rail point, show copper and silver-lead ores. Was making small, but fairly regular shipments of ore, late 1913.

WABUSKA COPPER MINES CO.**NEVADA**

Mine office: Wabuska, Lyon Co., Nev. J. E. McDermott, manager. Property, the Minnesota group, 13 claims, 16 miles from Yerington, is said to carry large deposits of iron ore, forming a gossan of 50 to 100' width, covering a contact deposit, between limestone and granite, of about 20' average width, carrying sulphide ore assaying 1 to 30% copper.

Development is by 2 shafts, 1 of about 500' depth, showing ore said to average better than 3% in copper tenor. There also are several shallow pits, deepest 15', showing ore giving assays of 2 to 40% copper. The property has necessary mine buildings. Presumably idle.

WAGNER AZURITE COPPER CO.**NEVADA**

Office and mine: Luning, Mineral Co., Nev. Frank Everett, pres. and mgr.; S. K. Bradford, vice-pres. and engr.; K. C. Martin, sec.-treas.; preceding officers, H. D. Keefer and Jas. I. Keller, directors; W. W. Weisbach, supt. Organized July 15, 1907, under laws of Nevada, capitalization \$2,500,000, increased 1910 from \$2,000,000; shares \$1 par, nonassessable; issued 1,146,034 shares. Annual meeting, second Tuesday in September.

Property, 20 claims, in 2 groups, unpatented, 400 acres, in the Goldyke district, 32 miles N. E. of Luning and in the Wagner and Fair Play districts, latter 35 miles E. of Mina, the nearest rail point. The Atwood group, which is the principal property, shows a contact zone of about 600' width, traceable 2,000' between an altered granite foot and limestone hanging, with N. W.-S. E. strike and dip of 50° N. The outcrop carries silver and gold-copper ores with a quartz gangue. Development consists of 2 tunnels, of 1,700' and 350', with a total of 2,185' of workings.

The Nevada-Wisconsin group, purchased 1913, shows several dikes of 50 to 100' width of which 1, said to show sulphide ore of 2 to 11% copper, is under development by shaft.

Equipment includes a 40-h. p. steam plant with a 15-h. p. hoist and a 3-drill straight-line air compressor. The management plans continuing mining development and building a 100-ton leaching plant and 10-stamp mill. Property considered promising.

WALCOTT COPPER MINING CO.**WYOMING**

Office and mine: Walcott, Carbon Co., Wyo. W. C. Sammons, pres.; F. A. Raynor, vice-pres.; W. W. Petty, mgr., at last accounts. Organized 1907, capitalization \$1,000,000. Property, the Elkhart mine, with 7 claims, near Elk mountain, is said to have an 80' shaft that shows a good sized orebody of about 3% copper. Equipment includes a small steam plant and hoist. Idle.

WALDO SMELTING & REFINING CO.**OREGON**

Office: P. O. Box 64, Colorado Springs, Colo. Mine office: Takilma, Josephine Co., Ore. Spencer Penrose, pres.; Chas. L. Tutt, Jr., vice-pres. and sec.; J. A. Hull, treas.; preceding officers, J. A. Hayes, J. O'B. Gunn and Col. T. Wahn-Morgan Draper, directors; E. C. Tucker, supt. Organized Dec. 3, 1901, under laws of Colorado, capitalization \$3,000,000, shares \$100 par. Is closely affiliated with the Takilma Smelting Co., and owns a share interest therein.

Property, 20 claims, patented, 400 acres, with a mill site and 650 acres of placer ground, near the Queen of Bronze mine, about 40 miles from the S. P. R. R. The claims show several fissure veins said to average 10' in width and to carry sulphide ores averaging 12% copper and \$3 gold per ton. The mine has a shaft and 3 tunnels. The Copper King shaft, about 200' deep, has an 80' level showing a good orebody. The 700' Lyttle tunnel and the 400' No. 2 tunnel, on the same claim, are also said to show good orebodies. The 310' Cowboy tunnel connects with the incline shaft 160'

below surface and was planned to be extended to intersect the known pay-shoots. Management considered good and property promising.

WALDORF CONSOLIDATED MINING CO. COLORADO

Office: 725 Colorado Bldg., Denver, Colo. Mine office: Georgetown, Clear Creek Co., Colo. John S. Mouro, pres.; Fred W. Webber, vice-pres.; Edw. J. Wilcox, sec.-treas. and mgr., at last accounts. Organized 1908, as a reconstruction of the Waldorf Mining & Milling Co., capitalization \$3,600,000, shares \$1 par, in \$400,000 of 7% cumulative preferred stock and \$2,300,000 common stock issued.

Lands, 600 acres, patented, including the Tobin mine, in the East Argentine district. The claims show a strong fissure vein that has a 4' pay-streak of gold-bearing copper ore. Development includes the Tobin and Wilcox tunnels with about 7 miles of workings. Equipment includes a 125-ton mill, at the portal of the Wilcox tunnel.

WALKER MINING CO.

CALIFORNIA

Office: Main and Third South Sts., Salt Lake City, Utah. Mine near Portola, Plumas Co., Cal. Jos. R. Walker, pres.; Chas. H. Post, sec.-treas. Organized Sept., 1909, under laws of Utah, capitalization \$100,000, shares 10 cts. par; issued, \$750,000. Control of company is said to have been purchased 1913, by the Cowan-Browning interests of Salt Lake City and Ogden.

Property, 16 claims, 10 patented, heavily timbered, with a good water power available, in an unorganized district, 18 miles N. E. of Portola, on the Western Pacific railroad. The claims show altered diorite with a big gossan outcrop up to several hundred feet in width, running N. W. across several claims, underlain by a vein estimated to be 27' wide with a shallow zone of oxidation, succeeded by sulphide ore carrying some secondary sulphides, but mainly chalcopyrite. This ore is estimated by the company to average 6% copper, 3 oz. silver and \$1 gold per ton.

Development consists of 35' and 70' shafts. The 70' shaft has a 27' crosscut at the bottom showing a wide orebody with an 8' paystreak assaying up to 4.5% copper, 3 to 5 oz. silver and \$1 to \$2 gold per ton; the balance of the crosscut shows ore of about 2.75% copper with small gold and silver values.

Equipment includes a small steam plant with a 20-h. p. hoist and several mine buildings.

WALLA WALLA COPPER MINING CO.

WASHINGTON

Office: Walla Walla, Wash. Mine office: Keller, Ferry Co., Wash. Jasper King, superintendent. Property, 1 mile N. E. of Keller, in the southern half of the old Colville Indian reserve, shows a vein of 30' estimated width, partially mineralized with gold-copper ore of fair assay value, developed by an opencut shaft and tunnel. No recent returns secured.

WALNUT CREEK MINING & MILLING CO.

ARIZONA

Mine address: Kingman, Mohave Co., Ariz. C. E. Worton, pres.; J. M. Worton, mgr. Property, 10 miles from Kingman, shows a 14" vein of gold and silver-bearing copper ore. Presumably idle.

WALNUT GROVE GROUP.

ARIZONA

Mine address: Miami, Ariz. P. A. Schilling, manager. Property consists of claims and a mill site N. W. of the Ray Consolidated holdings. The claims show mineralized schist said to be similar to that in the Ray mine and lying next to a heavy limestone outcrop. Development is by shafts, with a number of drifts showing ore. Was developing with small force, at last accounts.

WAR EAGLE GOLD & COPPER MINING CO.

MONTANA

Mine address: Alhambra, Jefferson Co., Mont. Lands, 3 claims, 7 miles

S. of Alhambra, in Warm Springs gulch. Claims show strong fissure veins in granite. Values occur in paystreaks in soft altered granite, the ore consisting of pyrite and a little chalcopryite, whose value is mainly in gold.

Development is by a 300' tunnel, planned to intersect the vein at about 1,500' and give a back of about 500'.

WAR EAGLE MINE.

BRITISH COLUMBIA

Rosslund, B. C., owned by the Consolidated Mining & Smelting Co. of Canada, Ltd.

WAR EAGLE MINE.

YUKON

Mine office: White Horse, Yukon, Canada. The property is owned by Messrs. Caldwell, Points, Lucas and Kesler. Lands, 3 claims, 1 fractional, 6 miles from White Horse, show a contact metamorphic deposit between limestone and granite. The ore zone has extreme width of 230', and shows garnetiferous ore carrying chalcopryite and bornite, giving assays of 2.71 to 46% copper. The ore zone has been traced for 1,500' by 6 pits and trenches. Development is by pits of 26' and 28' and a 140' tunnel. Property has shaft house, cook house, smithy and ore bin. Presumably idle.

WARDWELL & OSBORNE COPPER MINES CO.

ARIZONA

Letters unclaimed at former office: 714 International Bank Bldg., Los Angeles, Cal. Mine office: Osbornes Well, via Parker, Yuma Co., Ariz. Edw. S. Osborne, pres. and gen. mgr.; Chas. W. Wardwell, vice-pres. and treas.; Fred W. Morrison, sec.; preceding officers, Edw. S. Osborne, Jr., and E. M. Wardwell, directors. Organized under laws of Arizona, capitalization \$1,000,000, shares \$1 par.

Property, 9 claims, 120 acres, 4 miles N. W. of the Consolidation Copper Mines Co., in the Seneca district, 7 to 10 miles E. of Parker by good wagon road. Claims show an extensive gossan consisting largely of specular iron. Development is by a number of shallow pits, shafts and tunnels. A 143' incline shaft shows ore assaying 4 to 32% copper and 75 cts. to \$9 gold per ton. There is also a 400' tunnel, showing a vein 8 to 28' wide, carrying ribs of rich oxidized ores alternating with streaks of leached and barren limestone, the rich ores being claimed to average 15% with maximum of 42% copper. The mine has about 1,100' of workings. Property is reported to have been sold to the Carnation Copper Co. and company is probably in liquidation.

WARREN REALTY & DEVELOPMENT CO.

ARIZONA

Office: 1400 Alworth Bldg., Duluth, Minn. Mine office: Warren, Cochise Co., Ariz. Henry B. Hovland, pres.; Chas. A. Duncan, first vice-pres.; Chas. d'Autremont, Jr., second vice-pres.; Frederic R. Kennedy, sec.; preceding officers, Chester A. Congdon, Thos. F. Cole and Capt. Jas. Hoatson, directors; Henry B. Paull, treas.; John C. Greenway, gen. mgr.

Organized June 29, 1905, under laws of Arizona, capitalization \$900,000, shares \$15 par; issued \$1,260,000, fully paid. Controls, jointly with the Calumet & Arizona Mining Co., Superior & Pittsburgh Copper Co. and Copper Queen Consolidated Mining Co., the Warren Co., a corporation capitalized at \$665,000, that owns the town site of Warren, the public utilities therein, and the Bisbee & Warren street railway.

Annual meeting, second Tuesday in April.

Property, about 1,700 acres, covering the town of Warren, in the district of that name, includes the Cunningham group and former holdings of the Calumet & Cochise Development Co., 3 claims of the latter group being of mineral value. Considerable diamond drilling was done, 1907-08, with 1 hole 3,200' deep vertically, said to be the deepest in the United States.

The Lone Star shaft, started 1905, on the Lone Star claim, 2½ miles S. E. of the Junction shaft of the Superior & Pittsburgh, has 3 compart-

ments and is 844' deep, sunk in limestone throughout. Development to the N. indicates that ore-bearing ground cannot be expected at much less than 2,000' depth. Management considered good and property valuable for surface rights, but with a possibility of making a mine when developments on surrounding tracts have proven the ground. The shaft has been idle since Nov., 1908.

WARRIOR COPPER CO.

ARIZONA

Office: 907 Provident Bldg., Philadelphia, Pa. Mine office: Black Warrior, Gila Co., Ariz. Spencer D. Wright, pres.; W. H. Francis, vice-pres.; D. H. Paris, sec.; H. S. Hopper, treas.; officers are the directors. Organized March 10, 1905, under laws of Delaware, capitalization \$1,600,000, shares \$10 par, in \$750,000 cumulative 7% preferred stock and \$850,000 common stock, as successor of Black Warrior Copper Co., Amalgamated, which came to grief. Bonds \$100,000, issued \$40,000, at 6%, with interest paid.

An option on the property, given 1909, to the Warrior Development Co., was relinquished Oct., 1911, and suit was thereupon entered against that company for failure to observe the terms of the agreement. This suit is still pending.

Lands, 58 claims, about 1,000 acres, including the Black Warrior group and the Lost Gulch group, near the Inspiration mine. The principal property is the Black Warrior mine, a producer since 1904, located about 7 miles N. W. of Globe.

The Black Warrior property shows slightly altered schist, dacite tuff, diabase and conglomerate, the greater part of the area being covered by schist, which is the oldest formation. The diabase occurs as intrusive dikes, and the dacite is a surface flow over both schist and diabase. The Black Warrior vein is a fault zone 30 to 60' wide, filled with crushed mineralized dacite for about 300', with a breccia of schist and some diabase below. The vein has a generally E.-W. trend, and W. pitch. The ore averages about 50 to 60' in width, though a width of 100' is shown at a number of points. This property includes the Montgomery group, with the Montana and Dadeville mines, developed by tunnels of about 1,000' and 1,200' length, developing extensive bodies of copper silicates and hydrated copper oxides of excellent average value. The Black Warrior mine is developed by the Winnie shaft, 500' from the western boundary, and tunnels of about 1,000' and 1,200' length, opening the mine to a depth of 300', with 5 levels, spaced at 50' intervals. The mine has yielded a large tonnage of high-grade ore, giving assays of 8 to 25% copper, between the 200' and 300' levels. Considerable churn drilling was done 1910-11, 1 hole in the vicinity of the Winnie shaft being sunk 506' in schist, showing mineralization, and a 580' drill hole proved the existence of chalcopryite, disseminated in schist, though not of commercial value. The western portion of the property was tested without favorable results by churn drill, May, 1911.

The Lost Gulch claims show a highly altered monzonite-porphry covering the larger part of the area, with extensive outcrops of dacite and limestone and smaller ones of diabase, general geological conditions being much the same as at the Black Warrior.

Equipment includes a steam plant, burning petroleum. Buildings include an assay office, engineering office, smithy, carpenter shop and several dwellings, and there is a 300-ton shipping bin.

A portion of the property has been leased to Messrs. Fiske and Snell, who are operating the plant and shipping about 100 tons of ore daily.

The old mill and mill site at Warrior P. O., about 1½ miles E. of the mine, was sold 1912, to the Inspiration Consolidated Copper Co.

WARRIOR DEVELOPMENT CO.**ARIZONA**

Office: 505 Lonsdale Bldg., Duluth, Minn. Henry B. Hovland, Harvey P. Smith, Michael McCarthy, David L. Fairchild, J. C. Rotterhaus, Edw. C. Congdon and Samuel R. Kaufman, directors, at last accounts. Organized 1909, under laws of Arizona, capitalization \$500,000, shares \$10 par, in \$50,000 full paid and \$450,000 of stock, \$4 paid; issued \$451,500. Boston Safe Deposit & Trust Co., transfer agent. Annual meeting, second Tuesday in September.

The company held a \$1,250,000 three-year bond and lease, dated Oct. 9, 1909, on the Black Warrior and Lost Gulch groups of the Warrior Copper Co., which was relinquished Oct., 1911, after a payment of \$100,000. The company has become involved in litigation with the Warrior Copper Co. based on the allegations that all monies realized from the sale of ore were not accounted for, and that the mine workings and the mill were handled contrary to the provisions in the agreement.

WARWHOOPE MINING CO.**IDAHO**

Letters unclaimed at former offices: Spokane, Wash., and Larson, Shoshone Co., Idaho. W. M. Lingefelter, pres.; A. L. Tinsley, sec.; H. C. Topping, mgr., at last accounts. Property, 6 claims, E. of the Snowstorm mine, in the Hunter district of the Cœur d'Alene region on the Idaho-Montana divide. Claims said to carry about 1 mile of the supposed extension of the Snowstorm vein. Development consists of a 600' tunnel, showing stringers of chalcopyrite and bornite. No returns secured.

WASATCH KING MINING CO.**UTAH**

Office: 2134 Seventh Ave., Troy, N. Y. Mine address: Milford, Beaver Co., Utah. Jos. A. Leggett, pres.; C. W. Cool, vice-pres.; Arthur J. Burch, sec.; Fred E. Wells, treas., at last accounts. Organized May 25, 1901, under laws of Utah, capitalization \$300,000, shares \$1 par, nonassessable. Lands, 7 claims, about 140 acres, known as the Wasatch King mine, near the holdings of the Majestic Mines Co., are 10 miles N. W. of Milford, developed by a 560' tunnel. Idle several years.

WASATCH MINES CO.**UTAH**

Office: Felt Bldg., Salt Lake City, Utah. Mine office: Alta, Salt Lake Co., Utah. P. W. Blake, superintendent. Organized 1913, as a merger of the Columbus Consolidated Mining Co., the Flagstaff Copper Co. and Superior-Alta Mining Co., capitalization \$1,000,000, shares \$1 par; issued 450,000 shares. The consolidation of these properties was effected on the basis of 160,000 shares for Columbus Consolidated Co., 100,000 shares for Flagstaff Co. and 40,000 shares for Superior-Alta.

Lands, 52 claims, about 650 acres, and mill sites at Tanner's Flat and at the mouth of Little Cottonwood canyon, on the E. flank of the Wasatch mountains.

The property shows a number of fissure veins cutting limestone, shale and quartzite, also numerous bedded contact deposits between limestone and quartzite. The bedded deposits contain the principal orebodies. Occasional highly-mineralized shoots are found ranging from 30 to 100' in width, several hundred feet long, and carrying up to 8% copper, 18% lead, 15% zinc, 60 oz. silver and \$4 gold per ton, but ore is generally pockety and that now in sight is mainly below payable tenor. Ores are carbonates at and near surface, succeeded by sulphides at depth.

The Flagstaff group carries several ore deposits, 1 of which, ranging up to 300' in claimed width, and traceable 2,000', is developed by the 5,000' Tom Moore tunnel. This tunnel also cuts 6 smaller veins, and has a 450' crosscut to the N. E., with about 13,000' of workings. Other workings include the 500' Burgess tunnel, 1,200' Burnswood tunnel, 1,200' Flagstaff

tunnel, and the 700' Flagstaff shaft. The mine was a considerable producer of silver-lead carbonates, in early days.

The Columbus Consolidated group shows a vein, known as the Braine fissure, of about 12' average width, opened by 2 tunnels, 1,250' apart, on practically the same level. The mine has 5 shallow shafts and 4 tunnels, including a drainage tunnel, 4,000' down the canyon, planned to unwater the Columbus and adjoining properties, with about 3 miles of workings. The Holland and Columbus tunnels are connected on the Braine fissure, the first-named with electric traction. The output is divided into copper ore, silver-lead ore and concentrating ore. The mine is wet and has a 600-gal. pump.

A Pelton water wheel works under a head of 494', taking water through a 20" and 22" steel pipe line of 4,500' length, developing 660 h. p., which is transformed into electricity by two 300-kw. dynamos and carried to the mine by a 4½-mile transmission line. At the mine there are four 25-h. p. hoists good for 600' each, 10-drill Nordberg and 5-drill Ingersoll-Sergeant air compressors, a machine shop and a sawmill.

The 150-ton concentrator was built of material taken from two old 100-ton mills. Equipment includes a Gates gyratory crusher, 2 sets of Rogers rolls, six 3-compartment jigs and 7 Wilfley tables, the mill putting about 4 or 5 tons into 1.

WASHINGTON COPPER MINING CO.

MICHIGAN

Office: Calumet, Mich. Mine near Delaware, Keweenaw Co., Mich. Chas. A. Wright, Jr., sec.-treas.; Thos. F. Cole, Spencer R. Hill, G. G. Hartley and Thos. Hoatson, directors. Organized under laws of Michigan, capitalization \$2,500,000, shares \$25 par; issued \$1,500,000. Is controlled, through ownership of a majority of issued stock by the Keweenaw Copper Co. Annual meeting, fourth Tuesday in March. Lands comprise 1,050 acres, on the western shore of Mosquito lake, on which desultory work has been done at intervals in the past. Idle since 1901.

WASHINGTON-IOWA COPPER MINING CO.

WASHINGTON

Office: care E. P. Hewitt, Index, Wash. Lands, on the eastern fork of Silver creek, 2 miles above Mineral and 14 miles N. W. of Index, adjoin the Edison Mining & Development Co., and both properties are worked under 1 management. Claims are said to show 5 veins, carrying an auriferous, argentiferous and somewhat arsenical complex ore, consisting of chalcopyrite, galena, sphalerite and pyrite, with quartz gangue. Development is through the Bonanza crosscut tunnel, of about 1,200' length, planned to be driven 3,000', which is said to have cut 4 different veins. Equipment includes an air compressor. Presumably idle.

WASHINGTON MINES DEVELOPMENT CO.

MEXICO

Office: Douglas, Ariz. Mine office: Washington Mine, via Huepac, Sonora, Mex. F. O. Bostwick, pres.; A. R. Dickson, sec.-treas.; Gilbert Melcher, supt. Organized 1911, under laws of Arizona, capitalization \$1,500,000, shares \$10 par; issued 90,000 shares.

Property, 76 acres, with options on 174 acres additional, in the Arizpe district, 60 miles from Nacozari, the nearest rail point. Property shows a big "pipe" ore deposit composed of brecciated rhyolite cemented by chalcopyrite. Ore is reported to average 3.5% copper and about \$5 in combined gold and silver values.

Mine is opened by 3 tunnels and there are 2 air shafts with a total of about 6,000' of workings said to show 350,000 tons of ore blocked out for stoping. Company plans development at depth by sinking a winze from No. 2 tunnel level, 313' below the outcrop, and expects to add 4 additional levels to the workings with the funds in hand. Equipment includes a small

steam plant, with hoist good for 500'. Property promising but needs railroad transportation for profitable working.

WASHOE COPPER CO.

MONTANA

Office: 42 Broadway, New York. Former mine office was Butte, Silver Bow Co., Mont. A. H. Melin, pres.; Benj. B. Thayer, vice-pres.; H. J. Meehan, treas. and asst. sec.; preceding officers, John D. Ryan and D. B. Hennessy, directors; D. G. Stivers, sec. Capitalization \$20,000,000, shares \$10 par; issued \$3,046,400. Property was sold May 31, 1910, to Anaconda Copper Mining Co., for 380,000 shares of Anaconda stock. The company is to be dissolved, and its assets, now consisting solely of Anaconda stock, distributed pro rata among shareholders.

Property formerly owned by the company was very fully described Vol. VIII.

WASHOE SMELTER.

MONTANA

Owned by Anaconda Copper Mining Co., at Anaconda, Mont.

WASHOUGAL GOLD & COPPER MINING CO.

WASHINGTON

Letter unclaimed at former office, 5312 Maple Ave., St. Louis, Mo. Mine office: Washougal, Clark Co., Wash. F. A. Mabee, pres.; John Scharboarer, vice-pres.; J. B. Jordan and T. A. Altman, secretaries; Dr. Otta Sutter, treas., at last accounts. Organized 1902, under laws of South Dakota, capitalization \$1,000,000, shares \$1 par.

Lands, 560 acres, held on a 30-year lease, from the state, near Mt. St. Helens, in the Bald Mountain district, on the upper Washougal river. The claims show several vertical fissure veins in granite, 1 of which, averaging 6' thick, is developed by an 1,800' tunnel exposing ore, estimated to average 5 to 20% copper, 15% lead and zinc, 2 to 70 oz. silver and \$1 to \$15-gold per ton.

Equipment includes gasoline hoists and a 3-drill Sullivan air compressor. A hydro-electric plant, installed 1908, has a Pelton wheel, developing about 150-h. p. under a 500' head. There also is a small sawmill, a brick-yard and a 25-ton concentrating mill. Presumably idle.

WAUBA YUMA MINE.

ARIZONA

Mine near Kingman, Mohave Co., Ariz., is a copper prospect, developed by shaft 100' deep, at last reports, showing a 6' vein of good ore at this depth.

WAYNE DEVELOPMENT CO.

ARIZONA

Mine office: Quijotoa, via Weldon, Pima Co., Ariz. W. S. Edwards, superintendent, at last accounts. Property, 49 claims, partly patented, 980 acres and 3 mill sites, total of 1,020 acres, in the Quijotoa district, 40 miles from the Red Rock-Silver Bell railroad. Claims show mineralized zones between granite and andesite carrying several orebodies, 1 of which is said to be 200' wide and characterized by gold ores. The other orebodies show copper ores containing malachite near surface, succeeded by chalcopryrite, mixed with lead and zinc sulphides beneath the oxidized zone. The ore is reported to average 10 to 30% copper and 5 to 70% lead.

The mine has an old 1,800' crosscut tunnel, long abandoned, 7 shafts of 60 to 330' depth and about 10 tunnels, longest 430', with total workings of about 4,500'.

Equipment includes steam and gasoline engines, aggregating 500 h. p. at the mine and mill, two 45-h. p. hoists, good for 700' depth, and Fairbanks-Morse and Leyner air compressors of 5 drills aggregate capacity, with 17 buildings. The 100-ton stamp mill and concentrator has 30 gravity stamps and a 250-h. p. engine, 4 Blake and Samson crushers, one 50-ton Elspass centrifugal crusher and 3 Standard tables. Presumably idle.

W. B. LOWE MINING CO.**COLORADO**

Mine and works office: Silverton, San Juan Co., Colo. A. A. Lamont, superintendent, at last accounts. Lands, bought 1909, of the Boston & Silverton Mining & Reduction Co., include claims in Illinois gulch, shortly N. of Silverton, carrying gold-bearing lead and copper ores, and the Arpad mine and mill, on King Solomon mountain. Equipment includes steam power, and the company apparently owns the Silverton smelter also.

WEIMER COPPER CO.**IDAHO**

Office: care Jesse Knight, Provo, Utah. Mine near Dubois, Frémont Co., Idaho. Lands, 18 claims, 360 acres, on Birch creek, in the Skull canyon district. The property shows a crush zone 100 to 200' thick on the bedding plane between quartzite and limestone. This deposit carries high-grade ore in pockets and in cross fissures, of 3" to 2' width, running at right angles to the main contact deposit. Development is by an open cut and 3 tunnels, 2 longest of 300' each. Considerable ore was shipped, returning 16 to 18% copper, with a production of about 200,000 lbs. fine copper, 1907. Idle several years.

WELDON GOLD & COPPER CO.**ARIZONA**

Letters to former offices at Tucson, Weldon and Quijotoa, Pima Co., Ariz., have not been replied to. Ferris S. Fitch, sec.-treas. and gen. mgr., at last accounts. Company apparently has lost its lands to the Wayne Development Co. (which see), and is presumably dead. Fully described Vol. X.

WELLS BAY MINING CO. OF ALASKA.**ALASKA**

Letters unclaimed at former offices, 1328 Broadway, New York, and Valdez, Prince William Sound district, Alaska. Samuel H. Rapp, pres.; G. A. Leveroos, vice-pres.; Wm. Glendenning, second vice-pres. and mgr.; Dr. Samuel Rapp, treas., at last accounts. Organized under laws of Delaware, capitalization \$1,500,000.

Lands, 12 claims, on Glendenning bay, an arm of Wells bay, are slightly developed by 3 tunnels and a shallow shaft, showing a small amount of high-grade copper ore with fair gold and silver values. Equipment includes several buildings. Idle, and not regarded favorably. See Vol. X.

WENDENDALE GOLD MINING CO.**ARIZONA**

Mine office: Wenden, Yuma Co., Ariz. Otis E. Young, manager, at last accounts. Lands, in the Cunningham Pass district, are developed by a shaft, showing ore that gave returns of 13% copper and \$12 gold per ton, from a test smelter shipment. Probably closed down.

WENTWORTH COPPER CO., LTD.**NOVA SCOTIA**

Mine office: Wentworth, Cumberland Co., N. S. Organized 1907, to acquire lands, bought at foreclosure sale, of the Cumberland Copper Co. Company apparently holds property for speculation purposes as no work has been done since purchase and no preparations are reported.

WERTZ MINE.**WYOMING**

Office: Dalton, Ohio. Mine address: Thermopolis, Fremont Co., Wyo. John I. Wertz, manager. Lands, 9 claims, in the Willow Creek district, 18 miles from Thermopolis, the nearest rail point.

The property shows a mineralized dike of diorite intrusive in granite that is reported to be 100' wide and to carry numerous stringers and veinlets of sulphide ore, with quartz gangue, reported to average 10% copper and up to \$2 gold and 125 oz. silver per ton.

Development is by 3 tunnels, longest 93' and by a 100' shaft, with total workings of about 400'. The shaft is said to expose an 18' vein carrying gold-silver ore that assays \$18 gold and 160 oz. silver per ton, figures regarded as excessive. The mine has no power equipment.

WESSELL COPPER MINING & MILLING CO.**ARIZONA**

Letter unclaimed at former office, St. Louis, Mo. Mine office: Casa Grande, Pinal Co., Ariz. R. J. Wessell, pres. and gen. mgr.; N. Ruppener, vice-pres.; H. J. Praechter, sec.-treas. Property, the American Boy mine, 2 miles N. of Toltec, shows a 10' vein with ore that assays 10 to 14% copper, and about \$2 gold per ton, with occasional small silver values. Development includes a 97' shaft equipped with a steam hoist and air compressor. Presumably idle.

WEST COAST MINING & SMELTING CO.**MEXICO**

Letters unclaimed at former offices, 1419 Pennsylvania Bldg., Philadelphia, Pa., and Mocorito, Sinaloa, Mex. Howard L. Haines, pres.; Chas. M. Hicks, sec.; Edw. W. Hicks, gen. mgr., at last accounts. Organized 1906, under laws of Maine, capitalization \$2,500,000, shares \$1 par, non-assessable, in \$500,000 of 7% cumulative preferred stock and \$2,000,000 of common stock.

Lands, 6 groups, 387 acres, 5 to 20 miles from Mocorito, and 12 to 40 miles from Carbó. Principal property is Los Tajos group, 357 acres, including the San Antonio, San Manuel, Los Tajos and Ampliacion de Los Tajos claims, showing andesite, cut by 3 narrow fissure veins of 4' average width that are said to carry chalcopryrite ore, estimated by the company to average 5% copper, 4 oz. silver and \$2.50 gold per ton. The River mine, of Los Tajos group, has a 150' shaft, on a vein of 5 to 8' reported width, carrying ore said to average about 5% copper and \$3 per ton in combined gold and silver values. There are also a number of tunnels on this group.

Equipment includes a 70-h. p. steam plant, having a small Ingersoll-Rand air compressor and 6 Rand drills. There are several buildings. The 30-ton experimental concentrator has a 7x10" Blake crusher, 2 rolls, 2 Bartlett tables and 3 screens. The smelter, at the mine, has a 50-ton water-jacket blast furnace. Idle, and not favorably regarded.

WEST COAST SMELTING & REFINING CO.**MEXICO**

Office: 501 Columbia Bank Bldg., Pittsburgh, Pa. Mine office: Tecolote, via Carbó, Sonora, Mex. W. B. Duvall, pres. and gen. mgr.; T. C. Weaver, vice-pres.; H. G. Lupold, sec.-treas.; other directors, C. H. Kittredge, G. G. D. A. Van der Werff, Wm. Schutte and A. Van der Schuyt; Hugo von Berckefeldt, supt.; Ricketts & Banks, engrs. Organized June 1, 1908, under laws of Arizona, capitalization \$10,000,000, shares \$10 par, nonassessable; issued 751,000 shares. Debentures, \$750,000; issued \$420,000, at 6%. Stock is listed on the Amsterdam and Paris stock exchanges. Annual meeting, second Tuesday in November.

Lands, 1,156 acres, in the Altar district, 42 miles from Carbó, the nearest rail point. The property shows a number of contact deposits between porphyry and limestone, standing almost perpendicular, and striking S. E.-N. W., of which 2 are reported as of 65' average width, traceable 3,300', and carrying an average of 4% copper, 12% zinc, 4 oz. silver and about \$1 gold per ton. Ore minerals are principally chalcopryrite and sphalerite.

The mine has 5 shafts of 70', 73', 100', 100' and 565', and 4 tunnels of 30', 50', 250' and 250', with a total of about 5,000' of openings, said to show 1,000,000 tons of ore blocked out for stoping, which is a gross exaggeration.

Equipment includes a steam plant, with 60-h. p. hoist, good for 1,000', and about 20 buildings. A 200-ton smelter is in course of erection. Auto trucks carrying loads up to 12 tons, are used in transporting supplies between the mine and the railroad.

WEST JORDAN SMELTER.**UTAH**

Owned by United States Smelting Co., at West Jordan, Salt Lake Co., Utah.

WEST MINNESOTA MINING CO.**MICHIGAN**

Office: 68 Devonshire St., Boston, Mass. Francis H. Whitman, pres.; Arthur C. Paine, sec. Organized about 1854, under laws of Michigan, capitalization \$500,000, shares \$25 par, having been set off by the Minnesota Mining Co. Property consists of 550 acres, lying mainly W. of the Ontonagon river, including the S. E. $\frac{1}{4}$ and E. $\frac{1}{2}$ of the S. W. $\frac{1}{4}$, and the fractional W. $\frac{1}{2}$ of the N. E. $\frac{1}{4}$ of Sec. 18, and the N. E. $\frac{1}{4}$ and E. $\frac{1}{2}$ of the N. W. $\frac{1}{4}$ of Sec. 19, T. 50 N., R. 39. W. About \$10,000 was expended in exploratory work, previous to 1854, without success, development having been confined to the N. E. $\frac{1}{4}$ of Sec. 19, on the line of the supposed strike of the contact vein of the Minnesota and National mines. No mining work has been done since 1854.

WEST VIRGINIA-WYOMING COPPER MINING CO.**WYOMING**

Idle. Office: Parkersburg, W. Va. Mine office: Rambler, Carbon Co., Wyo. Max Frankenberger, pres.; Myer Newberger, vice-pres. and gen. mgr.; Herbert Frankenberger, sec.; Geo. Newberger, treas.; John W. Buckley, supt.; Leo Von Rosenberg, cons. engr. Organized Feb., 1907, under laws of Wyoming, capitalization \$2,000,000, shares \$1 par, reduced 1910 to \$1,000,000; issued 331,217 shares. Annual meeting, first Tuesday in February.

Property, 8 claims, 7 patented, 118 $\frac{1}{2}$ acres, one-half mile from the Doane-Rambler mine, in the Battle Lake district. Claims are said to show 4 orebodies, of which 2 are contact deposits between diorite and quartzite, with 1 under development, of 5 to 15' width, traceable 3,000', carrying sulphide ores estimated to average 3% copper with small gold and silver values.

Development is by 260' and 90' shafts and a tunnel, 250' long, at last accounts. Equipment includes a 45-h. p. steam hoist and a 4-drill air compressor, besides several buildings.

WESTERN COPPER CO., LTD.**NEWFOUNDLAND**

Probably bankrupt. Property is the York Harbour mine, at York harbour, Birchy cove, Bay of Islands, N. F. Company ended 1911, with a debt of about \$6,000. Described Vol. X.

WESTERN COPPER GROUP.**BRITISH COLUMBIA**

Office: Flack Bldg., Vancouver, B. C. Geo. Martin, Wm. Shannon and J. B. Mathers, owners. Lands, 48 claims, partly patented, 2,136 acres, and 313 acres miscellaneous lands, suitable for smelter sites, town sites and for farming, on the Khutze river, about 10 miles from Swanson bay, in the Cassiar district.

The property shows the granites of the Coast Range batholith, cut by dikes of felsite and andesite. The country is well timbered, and very rugged, rising by precipitous slopes and narrow benches to altitudes of 4,000 to 6,000' within the area embraced by the claims. Principal ore showings occur in a narrow fissure vein in granite, seldom exceeding 4' in width, except where intersected by cross veins, or dikes, under which conditions the vein matter may widen to 10', and also show a higher degree of mineralization. This vein cuts through the mountain at an elevation of about 2,000' above the river, dipping at about 29°, and is traceable for a distance of about 8,000'. The ore contains bornite and chalcopyrite, associated with iron sulphides and has malachite in the oxidized zone. Copper minerals are frequently displaced by auriferous iron pyrite. A small shipment, sent to the smelter at Ladysmith, is reported to have yielded 3.75% copper, 1.85 oz. silver and 1.45 oz. gold per ton, though other samples gave assays up to 30% copper, and \$56 in combined silver and gold values.

Development is by numerous open-cuts, short tunnels and a shallow shaft. There is no power equipment on the property.

WESTERN DEVELOPMENT CO.**NEW YORK**

Office: 42 Broadway, New York. Arthur P. Heinze, pres.; Calvin O. Geer, vice-pres.; Horace G. Abell, treas., at last accounts. Organized 1907, and is practically the successor of Otto Heinze & Co., which firm became bankrupt in that year. Assets apparently consist of large shareholdings in the United Copper Co., and a law suit against the Barnes-King Mining & Development Co. in which the company secured judgment for \$75,000, but which a higher court has since set aside.

WESTERN MINING & LEASING CO.**UTAH**

Office: 1111 Newhouse Bldg., Salt Lake City, Utah. Letter unclaimed at former mine office, Frisco, Beaver Co., Utah. C. C. Parsons, Jr., vice-pres. and treas.; L. L. Nettleton, sec., at last accounts. Organized 1909, under laws of Utah, capitalization \$25,000, shares \$1 par. Property was a bond and lease on the Comet group in the Frisco district. Company is said to have been organized to take over the Nevada-Utah Mines & Smelters Corporation, and did have a bond and lease on the Comet group at Frisco. Inactive and probably defunct.

WESTERN MINING & MILLING CO.**UTAH**

Office: 422 McCormick Bldg., Salt Lake City, Utah. Mine office: Lincoln, Tooele Co., Utah. A. B. Hirth, pres.; E. D. Haskins, vice-pres.; J. H. Hurd, sec.; W. A. Cooke, treas.; John B. Taylor, supt. Organized 1897, and reorganized 1905, under laws of Utah, capitalization \$300,000, shares \$1 par, assessable, with 2 assessments levied; issued \$200,000. Is a close corporation, having only 9 shareholders.

Lands, 20 claims, 19 patented, 215 acres, in the Pine Canyon district, on the western slope of the Oquirrh mountains, 10 miles from a railway. The claims are developed by about 1,000' of workings, which are said to show auriferous and argentiferous copper and lead ores. Equipment includes a steam plant, a boarding house and smithy. Presumably idle.

WESTERN NEVADA COPPER CO.**NEVADA**

Presumably dead. Lands at Yerington, were sold, 1911, at sheriff's sale to Frank Knox, manager of the Bank of the Republic, Salt Lake City, Utah, and also the secretary of the company, to whom the company had become indebted for money advanced. Fully described Vol. X.

WESTERN PACIFIC COPPER CO.**UTAH**

Office: 208-69 East Third South St., Salt Lake City, Utah. Mine office: Callao, Juab Co., Utah. E. J. Yard, pres.; Jackson H. McCrystal, vice-pres. and gen. mgr.; Elroy M. Clark, sec.-treas., at last accounts. Lands, 320 acres, adjoin the Western Utah Copper Co., in the Willow Springs division of the Deep Creek district, in Tooele county, just over the Juab county line. The mine has a shaft and tunnel, developing ore averaging about 13% copper, 25% lead and 22% iron, with small silver and gold values. Occasional small shipments of ore have been made. Equipment includes a steam plant and air compressor.

WESTERN PACIFIC GOLD & COPPER M. & M. C.**UTAH**

Office: Salt Lake City, Utah. Letter unclaimed at former mine office, Ogden, Weber Co., Utah. Thos. F. Feeney, president. Capitalization \$1,000,000, shares \$1 par. Stock is listed on Salt Lake Stock Exchange. Lands, 12 claims, 2½ miles from a railroad, in the Sierra Madre district. Development consists of a 150' incline shaft and about 530' of tunnels, all showing low-grade copper sulphide ore carrying gold and silver values. Idle.

WESTERN PACIFIC MINING CO.**UTAH**

Office: 30 South Main St., Salt Lake City, Utah. Organized 1906, under

laws of Utah, capitalization \$100,000, shares 10 cts. par. Lands, 12 claims, unpatented, in the Silver Island district, 20 miles from a railroad, are slightly developed by a shaft and tunnel which are said to show gold-copper ore. No trace of recent operations securable. Presumably dead.

WESTERN SLOPE COPPER MG. & SM. CO.

COLORADO

Office: Thompson Bldg., Butler, Pa. Mine office: Grand Junction, Mesa Co., Colo. J. S. Shaw, president and general manager. Organized July 25, 1900, under laws of Colorado, capitalization \$750,000, shares \$1 par, nonassessable. Bonds, \$50,000 authorized, at 6%.

Lands, 13 claims, 8 patented, 130 acres, with about 100 acres timbered, in the Unaweep district, 23 miles S. E. of Grand Junction and 12 miles from Whitewater, the nearest rail point on the Denver & Rio Grande railroad. The property shows granite and diorite, cutting sandstone and limestone. The claims have 6 fissure veins, 2 of them under development showing paystreaks 8" to 4' thick of bornite and chalcopyrite ore, with malachite ore near the surface. Shipments of 17 carloads made some years ago, gave returns of 11 to 18% copper, 2 to 10 oz. silver and \$1 to \$5 gold per ton. Development consists of shafts of 250', 165', 160', 40', 69' and 72', with tunnels of 310', 305' and 35', the mine having 1,686' of workings.

Equipment includes a 50-h. p. steam plant, with a 40-h. p. hoist good for 1,000' depth, and there are 4 mine buildings. There is an old 50-ton matting furnace at the mine. The management plans adding an air compressor and pushing development when funds are raised. Property considered promising.

WESTERN UTAH COPPER CO.

UTAH

Office: 401 Dooly Bldg., Salt Lake City, Utah. Mine office: Ibapah, Tooele Co., Utah. W. S. McCornick, pres.; Capt. Duncan MacVichie, vice-pres. and gen. mgr.; Herman H. Green, sec.-treas., at last accounts. Organized 1906, under laws of Wyoming, capitalization \$2,500,000, shares \$5 par, nonassessable. Debentures, \$100,000 authorized, Aug., 1911.

Lands, 51 claims, 20, of 364 acres, patented, and a 340-acre ranch. Mining property is known as the Gold Hill mine, on Gold Hill, in the Clifton section of the Deep Creek district, some distance from Wendover, the nearest rail point, on the Western Pacific. The lack of railway transportation is at present a serious detriment to the property. The claims show a prominent iron gossan, with copper and lead streaks, formerly claimed to make a 12 to 15' vein, with a 3' paystreak assaying up to 20% copper, 6 to 22 oz. silver, and \$11 to \$14 gold per ton. Later development is said to show an orebody 85' wide, on the 150' level, that will average 5% copper. The mine is reported to have 100,000 tons of ore blocked out. Development includes 14 trenches, pits and shafts, a 600' shaft and a long tunnel, with upwards of 1 mile of workings, the tunnel showing a vein of about 20' width, of which a 5' footwall paystreak carries silver-lead sulphides, balance of vein being mainly iron oxide. Closed down late 1907, owing to lack of funds. Property considered promising.

WETTERHORN LAND CO.

MICHIGAN

Office: care W. H. Garlick, 990 W. Kensington road, Los Angeles, Cal. Lands, 760 acres, in Secs. 21 and 22, T. 51 N., R. 42 W., Ontonagon county. The property shows 14 copper-bearing beds of 4 to 9' average widths, the most important being an 8' bed of cupriferous sandstone, carrying native copper and silver, said to have given assays of 2.6 to 6% copper and 1 to 6 oz. silver per ton. Another vein, amygdaloidal in character, is opened by a shaft to a depth of 84', showing a small amount of copper on the hanging wall. Idle.

WHAT CHEER COPPER MINING CO.**WYOMING**

Office: 171 Westminster St., Providence, R. I. Letters unclaimed at former mine office, Riverside, Carbon Co., Wyo. Jacob Stevens, pres.; J. Frank Baird, vice-pres.; Oliver S. Alers, sec. and mgr.; Isaac L. Goff, treas., at last accounts. Organized under laws of Wyoming, capitalization \$600,000.

Lands, 4 claims, near the Aetna mine, on Dunkards creek, near Purgatory gulch. Development consists of a 65' two-compartment shaft and a 337' tunnel, said to show a 5' talcose vein with ores containing copper carbonates and stringers of chalcocite, carrying good gold and silver values. Equipment includes a steam plant and a small sawmill.

WHEALKATE MINING CO.**MICHIGAN**

Office and mine: Houghton, Houghton Co., Mich. Nathan F. Leopold, pres.; R. R. Goodell, vice-pres.; Reginald C. Pryor, sec.; Albert F. Leopold, treas. Organized Nov., 1902, under laws of Michigan, capitalization \$50,000, shares \$25 par. Lands, 240 acres, including the old Wheal Kate mine, on which a little misdirected work was done many years ago. Though primarily a land and town-site company, the company owns mineral lands in Sec. 17, which carry the southern extension of the Isle Royale and other cupriferous beds of the Keweenaw series. Did some diamond drilling, 1907; idle since.

WHIPPLE MOUNTAIN GOLD & COPPER CO.**CALIFORNIA**

Office: 405 South Hill St., Los Angeles, Cal. Letter unclaimed at former mine office, Needles, San Bernardino Co., Cal. Jos. L. Brice, superintendent, at last accounts. Lands, 21 claims, on Whipple mountain, 7 miles N. of the Parker bridge over the Colorado river and from the Santa Fe R. R.. The property has 4 parallel veins, 1 said to have an outcrop 75' across, carrying promising copper and gold values. Development is by a 180' two-compartment vertical shaft, cutting an 18' vein carrying ore giving assays of about 5% copper and \$20 gold per ton. Equipment includes a 15-h. p. Fairbanks-Morse gasoline hoist and an air compressor, and there are 4 buildings. Has been intermittently worked and assessments kept up for several years past.

WHITE CHIEF COPPER CO.**MONTANA**

Mine near Jefferson Island, Jefferson Co., Mont. Lewis Schmuck, Mrs. Helen Schmuck and Ben W. Wilson, incorporators. Organized Sept., 1913, capitalization \$1,000,000, shares \$1 par. Lands, sundry claims, in the Whitehall district, developed by an 1,800' tunnel showing copper ore. Development hampered by lack of working capital.

WHITE ELEPHANT MINE.**WASHINGTON**

Is owned by the Orient Gold Mines, Ltd. (which see).

WHITE HORSE MINING CO.**ARIZONA**

Letter unclaimed at former office, 20 Broad St., New York. Mine office: Prescott, Yavapai Co., Ariz. H. R. Frost, president, at last accounts. Capitalization \$2,000,000, shares \$1 par. Bonds, \$50,000. Lands, about 200 acres, known as the Fuller group, at Squaw creek, also a group of claims in the Walker district. Development is by 2 shafts and a tunnel. Equipment includes a 10-stamp mill. J. F. Wisner was fiscal agent. No returns secured.

WHITE KNOB COPPER & DEVELOPMENT CO., LTD.**IDAHO**

Presumably dead. Property was the White Knob mine, at Mackay, Custer Co., Idaho, now owned by the Empire Copper Co. For further details of this company and its predecessors, see Vols. IX. and X.

WHITE PINE COPPER CO.**MICHIGAN**

Office: 12 Ashburton Place, Boston, Mass. Mine address: Ontonagon, Ontonagon Co., Mich. Quincy A. Shaw, pres.; R. L. Agassiz, vice-pres.; Geo. A. Flagg, sec.-treas.; Jas. McNaughton, gen. mgr.; preceding officers,

D. S. Dean, F. L. Higginson and F. W. Hunnewell, directors; Thos. H. Wilcox, supt.

Organized 1909, capitalization \$5,000,000, shares \$25 par, in 150,000 common shares and 50,000 5% cumulative preferred shares; issued 85,320 common and 5,476 preferred. Is controlled by the Calumet & Hecla Mining Co. through ownership of entire issue of preferred stock and 43,202 shares of common stock.

Property, the White Pine mine and surrounding lands to the N., S. and W., formerly owned by the Keweenaw Association and others. The White Pine mine, 80 acres, is in Sec. 5, T. 50 N., R. 42 W., 3 miles E. of the Nonesuch mine. The other property was paid for in shares.

Property as a whole shows eruptive rocks with interbedded sandstone and conglomerates of the Secondary Keweenawan series. It also holds what F. E. Wright called epidote veins which are epidotal melaphyrs crossing the face of the cliffs parallel to the sandstones, but showing evidence of faulting and crushing. There is also a second set of minor, nearly vertical epidote veins which, unlike the first, are barren of copper. The sandstone beneath the melaphyr is a fine-grained, dark red, almost quartzitic rock that is jointed and has numerous calcite veins and occasional threads of malachite which extend down a few feet from the contact. The rock is, however, usually concealed by talus from the cliffs. Native copper also occurs in a very fine-grained sandstone-conglomerate. The dip of the bedded formation is towards the S. E., varying from 8° to 35°. The so-called Nonesuch formation consists of 2 parallel beds of sandstone running from 4 to 8' in thickness and separated by a 5' bed of slate. The beds carry considerable finely disseminated native copper which is as a rule very flaky. This formation is badly faulted and in the mine is reported to have been thrown so that the payable lode abutted directly against the unpayable one.

Development includes 2 exploratory shafts, 213' and 135' deep, and an incline shaft, 750' deep at the end of 1912. Both lodes are under development but the upper bed is much the richer and an upraise in No. 1 shaft has exposed about 200' of very rich ground above the first level. The property has been extensively diamond-drilled, more than 110 holes having been made since work was begun in 1907.

Property is decidedly promising.

WHITE STAR MINING CO.

UTAH

Idle. Office: 408 South State St., Salt Lake City, Utah. Mine office: Eureka, Juab Co., Utah. Richard B. Shepard, pres. and gen. mgr.; P. A. Sörenson, vice-pres.; Emma C. Shepard, sec.; Bernard Rich, treas., and Harry Rich, directors. Organized 1898, under laws of Utah, capitalization \$30,000, shares 10 cts. par, assessable, with 4 assessments levied. Lands, 4 claims, patented, 80 acres, 3 miles from Eureka, the nearest rail point. The mine has a 100' shaft and 100' tunnel.

WHITETAIL COPPER MINING CO.

ARIZONA

Letters unclaimed at former offices, Stanton, Tex., and Paradise, Cochise Co., Ariz. J. B. Chadwick, pres. and gen. mgr.; John L. Larriau, vice-pres.; E. P. A. Larriau, sec.; F. L. Conyers, treas., at last accounts. Organized Dec., 1909, capitalization \$1,000,000, shares \$2 par.

Lands, 25 claims, including the Doran & Gallagher group of 10 claims, carrying a 4' vein of gold-copper ore. Development includes a 120' vertical shaft, with other shafts of 45', 50' and 65', and a 250' tunnel. Buildings include an office, boarding house, bunkhouse, stable, general store and several dwellings. Idle.

WICKLOW MINING CO.

UTAH

Office: Salt Lake City, Utah. Mine office: Eureka, Juab Co., Utah.

J. D. Caldwell, pres.; A. J. Weber, sec.; M. W. Bird, treas. Capitalization \$500,000, originally in 500,000 shares of \$1 par, changed March, 1909, to 1,000,000 shares, par 50 cts. Lands, 6 claims, N. of Eureka Lily and E. of Tintic Development Co. Property shows several mineralized fissures in limestone on 1 of which a 527' shaft has been sunk. Idle several years.

WILHELMI SILVER & COPPER CO.

MEXICO

Mine office: Velardeña, Durango, Mex. R. Tipton, general manager, at last accounts. Organized under laws of Arizona, capitalization \$3,000,000. Lands, about 1,500 acres, include the Santa Eulalia, Loma, Cuchareña and other properties. The properties show auriferous and argentiferous lead and copper ores, developed by a shaft, known as the Santa Eulalia, and 2 tunnels. Idle since 1909.

WILLARD-ELY COPPER CO.

NEVADA

Office: 32 Liberty St., New York. Letters unclaimed at former mine office, Ely, White Pine Co., Nev. Organized 1906, as successor of McKinley Mines Co., succeeding the McKinley Mining & Smelting Co., succeeding the Canton Mining Co. Lands, 5 claims, known as the Aurora group, scattered and apparently poorly located. The Aurora, formerly worked as a gold mine, but showing copper ores in lower workings, has a 300' main shaft with about 1,000' of drifts. Idle, apparently since shortly after organization and by reason of its bad antecedents is regarded unfavorably.

WILLIAM PENN MINING CO.

WYOMING

Office: Lewisburg, Pa. Letter unclaimed at former mine office, Encampment, Carbon Co., Wyo. J. E. Hedding, pres.; J. W. Van Valzale, sec.-treas.; S. E. Phelps, mgr., at last accounts. Organized 1903, under laws of Wyoming, capitalization \$1,000,000, shares \$1 par. Lands, 3 claims, 60 acres, in the Upper Platte district, show a 4' vein carrying carbonate ores and chalcopryite, opened by a 75' shaft. Property long idle, but organization presumably intact and taxes kept up.

WILLIAMS LUMAN MINING CO.

WYOMING

Office: Buffalo, Wyo. Mine office: Depass, Fremont Co., Wyo. L. R. Vanhouten, president. Organized May 2, 1908, under laws of Wyoming, capitalization \$2,500,000, shares \$1 par; issued 2,385,000 shares.

Lands, 9 claims, patented, 130 acres, 16 miles from a railway, in the Copper Mountain district.

Property shows 8 fissure veins in granite, diorite and altered schists, the main vein being an ore zone of 50 to 60' width, traceable 3,400', in crushed and fissured diorite, much altered. This lode has a 2' paystreak carrying free gold, copper ore, and native copper in thin sheets and nuggets, ore minerals being cuprite, melaconite, malachite and chalcocite. Ore is reported to assay 10 to 80% copper, 5 to 10 oz. silver and \$2 to \$8 gold per ton.

Development is by an 820' shaft, showing sulphides on the 800' level, with other shafts of 52' and 30'. There also are tunnels of 513', 300', 70' and 80', and the mine has about 2,000' of workings.

Equipment includes an 80-h. p. gasoline plant, with a 15-h. p. hoist and a 2-drill air compressor. Electric current is taken, over a 16-mile transmission line, from the Asmus Boysen dam. There are 12 mine buildings. The company is operated as a close corporation, money for development having been furnished by about 10 shareholders only. Idle since May, 1912. Property favorably regarded, but needs railroad transportation.

WILLIE ROSE COPPER MINING CO.

ARIZONA

Office and mine: Portal, Cochise Co., Ariz. M. D. Taylor, pres.; Emmett Towers, vice-pres.; C. F. McCord, sec., at last accounts. Organized

Jan. 28, 1908, under laws of Arizona, capitalization \$1,000,000, shares \$1 par.

Lands, near Triangle Springs, have shafts of about 20' and 90', latter said to be bottomed in a 12' vein carrying slightly argentiferous chalcocite, of about 2% copper tenor, and a little gray copper ore is shown near surface. A 30-lb. nugget of native copper was found on the lands of this company. Was developing with a small force, at last reports.

WILMOT MINING CO.

MICHIGAN

Office: 990 W. Kensington Rd., Los Angeles, Cal. Mine near Ontonagon, Mich. W. H. Garlick, pres.; W. B. Goucher, sec. Organized under laws of Michigan, capitalization \$500,000, shares \$25 par. Paid dividends of \$17,000, from sale of timber lands, with mineral rights reserved, and has received \$1,500 from assessments. Owns mineral rights to 3,520 acres in Ontonagon county. No mining done.

WINDFALL MINING CO.

WASHINGTON

Mine office? Chewelah, Stevens Co., Wash. C. T. Rigg, superintendent, at last accounts. The property, developed by tunnel, is said to show several small veins of silver and gold-bearing lead and copper ores.

WINDSOR MINING, MILLING & SMELTING CO.

ARIZONA

Office: Superior, Pinal Co., Ariz. Wm. C. Windsor, manager, at last accounts. Organized 1906, under laws of Maine, capitalization \$1,000,000, shares \$1 par. Lands, 6 claims, known as the Windsor & Lobb group, and 4 mill sites, on Queen creek. The group is said to contain the southern extension of the ore zone of the Lake Superior & Arizona mine. Development is by several short tunnels, and 3 shafts, of about 60' depth each, bottomed in silver and gold-copper ore, in limestone. Presumably idle, but no recent returns secured.

WINNEMUCCA GROUP.

NEVADA

Mine address: Contact, Elko Co., Nev. J. H. Hubley, superintendent. Lands, 8 claims, 160 acres, 35 miles S. of Rogerson, the nearest rail point. The property shows a strong outcropping of ore, lying between granite and porphyry, and said to have given assays of 16% copper, 28 oz. silver and \$2.40 gold per ton.

Development is by open cuts, and a tunnel planned to intersect the vein at about 600', was in 200' at last reports. Rail facilities are badly needed by the entire camp and if financial conditions improve, the Oregon Short Line railroad is expected to build into the camp in 1914.

WINNIMUCK MINE:

UTAH

Owned by the Ute Copper Co., at Bingham Canyon, Utah.

WINNIPEG MINING CO.

WASHINGTON

Idle. Letters unclaimed at former office, Republic, Ferry Co., Wash. E. R. Fraser, gen. mgr.; Jos. L. Lancaster, supt., at last accounts. Property, the Hawkeye mine, and 8 claims, adjoining the Belcher on Lambert creek. Mine has a 240' incline shaft, connecting with a 1,070' tunnel developing a vein of 70' estimated width, carrying auriferous and argentiferous copper ore containing chalcopyrite associated with limonite, siderite, tetrahedrite, magnetite, pyrrhotite and marcasite. Has an ore bin on the Belcher railway, 600' from the tower tunnel, facilitating shipment. Has electric power and an 8-drill Leyner air compressor.

WINONA COPPER CO.

MICHIGAN

Office: 705 Sears Bldg., Boston, Mass. Operating office: Houghton, Mich. Mine office: Winona, Houghton Co., Mich. Chas. J. Paine, Jr., pres.; Nathaniel H. Stone, vice-pres.; other directors, W. A. Paine, Geo. P. Gardner, Walter Hunnewell, Chas. J. Paine and Jas. H. Seager. E. B.

O'Connor, sec.-treas.; Rex R. Seeber, supt.; Allan Eddyvean, mill supt.; John Broan, mg. capt.

Organized 1898, under laws of Michigan, capitalization \$2,500,000, shares \$25 par, increased 1911, to \$5,000,000; issued 166,667 shares, \$24 paid in. Last assessment, \$1, was payable Sept. 29, 1913. Company ended 1912 with surplus assets of \$62,034. The company 1911, acquired the property of the King Philip Copper Co., issuing 166,667 shares of Winona stock therefor. Boston Safe Deposit & Trust Co., registrar; American Trust Co., Boston, transfer agent. Shares are listed on the Boston Stock Exchange. Annual meeting, last Tuesday in March.

Lands, 2,608 acres, in a main tract of 2,480 acres, and a smaller tract of 128 acres, with timber rights to 1,768 acres additional, lying 3 to 5 miles S. of the mine. The company also owns a mill site at the mouth of the Sleeping river, with water available from that stream.

The main tract carries the outcrop of the Winona amygdaloidal bed for about 2 miles. The mine was discovered 1864, by a line of old Indian pits along the outcrop, and a single shallow shaft was sunk, but owing to entire lack of transportation facilities little was accomplished. The property was let on tribute 1880, but did not furnish sufficient mass copper to pay and was closed, until taken over by the present company April, 1898, when the old shaft was cut down, retimbered and deepened, and 3 new shafts sunk on the Winona bed, an amygdaloid of 12' minimum, 20' average and 46' maximum width, striking N. 59° E., and having an average dip of about 50°. The Winona amygdaloid greatly resembles both the Baltic bed and the Knowlton bed of the Evergreen belt, carrying considerable epidote, calcite and quartz, with a limited amount of both mass and barrel copper, though the bulk of the metal occurs in stamp rock. Diamond-drill borings have located several other cupriferous beds on the Winona tract, all lean where cut. The mine is on a spur of the Copper Range railway.

The older workings show mineral of the lighter grades, with somewhat heavier copper at depth. The mine made 3,060' of new openings in 1912, and ended the year with about 10 miles of workings.

No. 1, the discovery shaft, in the N. E. $\frac{1}{4}$ of the N. E. $\frac{1}{4}$ of Sec. 29, T. 52 N., R. 36 W., is 8x18' inside of timbers, with 3 compartments. It is 400' deep, and has 4 levels opened, which show a little heavy copper and some stamp rock in the northern drifts, but is of little promise and has been idle since 1901.

No. 2 shaft, 900' S. W. of No. 1, sunk at an angle of 72°, is 1,000' deep, with 9 levels opened, showing good copper at depth of about 200', but with poor ground below, and has been idle since early 1906.

Old No. 3 shaft, 900' N of No. 2 and about 750' deep, shows little ground of promise, and has been idle for some years. Old No. 4 shaft, the northernmost, about 1,350' N. E. of No. 1, developed no ground of importance, and also has been idle for some years. Old No. 5 shaft, started on a wide amygdaloidal bed located by diamond drill, did not develop good ground, and was discontinued at slight depth, some years ago.

New No. 3 shaft, 1,650' S. W. of No. 2, is bottomed at the 13th level. The 3d to 10th levels, inclusive, have been extended to No. 4 shaft at depth of 1,272', showing alternations of good and poor ground. The openings, as a whole, show rock carrying 12 to 15 lbs. fine copper per ton, allowing for judicious stoping and reasonable selection of ground broken.

Equipment at No. 3 shaft includes a steel shaft rock house, equipped with two 24x36" Portage Lake-Farrell crushers, with room for a third, pneumatic steel gates, pneumatic trolley cranes, and grizzlies having differ-

ential slopes, the lower portions being quite flat, grizzlies feeding to crushers.

No. 4 shaft, about 1,700' S. W. of No. 3, and about 400' from the southern boundary, ended 1912 at the 15th level. The shaft is sunk in the footwall and was opened by sinking and raising simultaneously. Underground work has been confined to drifting for the past year or 2, and considerable ground of promise has been opened. Connection is had with the King Philip workings on the 10th and 12th levels.

No. 4 shaft is equipped with a modern steel shaft rock house, having a cylindrical main bin of about 40' diameter, built of heavy steel plate. There are two 24x36" Portage Lake-Farrell crushers, similar to those at No. 3.

The hoist at No. 4 shaft, about 1,700' from the central plant, consists of a hoisting drum connected by double-reduction gearing with a 200-h. p. 550-volt induction hoist motor, operated at 430 r. p. m. The hoist, good for 1,500' depth, operates two 3½-ton skips, working in counterbalance, at a speed of 1,200' per minute.

King Philip No. 1 shaft, about 1,400' S. of Winona No. 4 shaft, is 14x25' in size, sunk about 85' in the footwall, at an angle of 70°, and is temporarily bottomed at the 14th level. The lode shows a width of 20 to 25', and carries considerable epidote.

King Philip No. 2 shaft is 2,780' S. of No. 1, on the southern side of Sleeping river, and 3,400' from the southern boundary of the tract. This shaft, temporarily idle, also sunk in the footwall, is 1,108' deep, with cross-cuts on the 6th, 8th and 10th levels, to the Winona bed, which gives a fair showing, about the same as in No. 1, with which it has underground connection on the 8th level.

Equipment at No. 1 shaft includes an electric hoist, similar to that at No. 4 Winona, and No. 2 shaft has an isolated steam hoisting plant. Both shaft houses are temporary.

The central power plant, near No. 3 shaft and about 1,600' N. of No. 4, furnishes direct current for both No. 4 shaft and King Philip No. 1 shaft. Equipment includes an Allis-Chalmers 250-kw. 3-phase 60-cycle 2,300-volt cross-compound a. c. generator, with a 535-h. p. induction motor direct-connected to two 250-h. p. d. c. generators, speeded at 600 r. p. m. The hoist at No. 4 and King Philip No. 1 is driven by an Allis-Chalmers cross-compound condensing Corliss engine. A motor-generator set consists of a 450-h. p. 3-phase 60-cycle 2,080-volt variable speed induction motor, at 600 r. p. m., connected on either side, by flexible couplings, to two 20-ton flywheels, 10' in diameter. The momentum of the flywheels cares for variations in load, and also provides power for hoisting for 1 hour after the dynamo is closed down, if necessary. The motor-generator set has 2 bearings of 11x33", and 2 bearings of 9x27" with oil pumped through them at the rate of 16 gals. per minute, automatically filtered and water-cooled, insuring perfect lubrication. There is a 100-kw. 575-volt General Electric interpole d. c. generator, a 150-kw. motor-generator operating the electric locomotives, transforming a 2,200-volt alternating current into a 500-volt direct current. There is a 40-drill Nordberg air compressor in the central power house, and steam is provided by three 100-h. p. water-tube boilers, operated at 175 lbs. initial steam pressure.

The engine house, midway between shafts Nos. 1 and 2, has a steam hoist, good for 1,500' depth, operating No. 3 shaft, and a 12-drill Ingersoll-Sergeant class A 2-stage straight-line air compressor, and a smaller single-stage compressor. Adjoining is the 40x48' boiler house of similar construction, housing four 80-h. p. boilers, and a wooden coal trestle, with tunnel beneath, leads to the boiler house.

The King Philip boiler house has a battery of two 200-h. p. Parker tubular boilers, coal being drawn to the boiler house through a concrete tunnel, under a coal trestle surmounted by a railroad track. The 34x40' power house has a 60-drill Nordberg 3-stage air compressor, with 6-drill and 15-drill auxiliary compressors.

Mine buildings include a 20x40' carpenter shop, combination smithy and machine shop, a 15x24' smithy, 26x36' warehouse, a 22x34' general store, an office building, 2 boarding houses and about 150 dwellings for employees, in a town site platted by the company. There also is a sawmill, 30x70' with a 42x66' wing for boilers, and a 16x46' wing containing a shingle mill, the plant having a daily capacity of 20,000' of sawed lumber.

The mill, built at a cost of about \$300,000, is located near No. 4 shaft, the location of the mill adjoining the mine saving about 13 cts. per ton in transportation charges. The mill secures its water from the Sleeping river, across which a dam has been built, with a storage capacity of 150,000,000 gals. Careful hydrographic surveys for 3 years show that the watershed tributary to this river yields about 3,000,000 gals. per day, which is enough for the mill, which will have settling tanks and clarifying devices, using the water several times over. The item of 13 cts. per ton transportation charges saved by the new mill may seem small, at first sight, but it actually means about 1 ct. per lb. on the cost of finished copper, and may mean the difference between success or failure, so closely are costs and income adjusted in a low-grade Lake Superior copper mine. The custom for many years past has been to put Lake Superior mills some miles away from the mines, on large bodies of water, but in the case of the Winona, the management has had to consider costs rather than the easier solution of its milling problem.

Rock, brought to the mill by electric locomotives, is crushed in 2 Allis-Chalmers stamps, 1 a simple head having a 24" cylinder, and 1 a steeple-compound head with 16" and 32" cylinders. Equipment includes 1 Chilean mill for regrinding, 6 Hardinge conical tube-mills, 52 Wilfley tables and 12 settling tanks. Under the wash floor there are 6 large settling tanks for the wash water, which is reused after clarification. Tailings are carried by belt-conveyor for a distance of 321' from the mill, and delivered at a height of 123' above the ground, forming a great hill of waste at hand for retreatment if the time ever comes when that proves profitable. Slimes are delivered by a 1,200' steel launder to a ravine beyond the sand discharge.

Production was begun 1902, and has been as follows: 1902, 101,188 lbs. copper; 1903, 1,036,944 lbs.; 1904, 646,024 lbs.; 1905, no production; 1906, 278,182 lbs.; 1907, 1,285,863 lbs.; 1908, 1909 and 1910, no production; 1911, 1,275,675 lbs., and 1912, 2,307,237 lbs.

The Winona has made 2 separate campaigns of production, on both of which occasions the percentage of copper extracted ran down to unpayable figures, returns averaging 18.95 lbs. fine copper per ton of rock stamped in 1904, 14.34 lbs. in 1906, and 12.59 lbs. in 1907, production having been suspended Nov., 1907. The average yield in 1912 was 12.73 lbs. fine copper per ton of rock stamped. Developments underground are much better to the S. of the property than in the original workings to the N., and the mine has been extensively opened, with a large tonnage of rock available for stoping. Notwithstanding the unsatisfactory results secured in the 2 previous campaigns of production, the Winona is considered to have very fair chances of making a successful low-grade mine, and the management is efficient and resourceful.

WINONA GOLD-COPPER MINING & MILLING CO. WYOMING

Office: 620 Courtland Bldg., Canton, Ohio. Mine office: Painter, Big

Horn Co., Wyo. L. Cavnah, pres. and gen. mgr.; Geo. House, vice-pres.; Dr. J. H. East, second vice-pres.; Wm. H. McAloney, sec.-treas.; preceding officers, Miss H. P. Straight, H. F. Tower, F. H. Weeks and W. H. Lippincott, directors; Ray Cavnah, supt., at last accounts. Organized 1903, under laws of Wyoming, capitalization \$5,000,000, shares \$1 par, fully paid. Management was changed and company practically reorganized Dec. 12, 1905.

Property comprises 25 claims, unpatented, 440 acres, in the Sunlight basin, on Silver creek, in the Bear Tooth and Sulphur mountains, in the N. W. corner of Big Horn county, about 12 miles E. of the Yellowstone National Park. Claims show granite, porphyry and andesitic breccia, carrying 6 fissure veins with shoots of low-grade copper ore. The ores carry chalcopyrite and chalcocite with some malachite and azurite and are reported by the management to average 7 to 8% copper with a paystreak carrying up to 25% copper and about \$3 gold per ton. The principal fissure veins in andesite are known as the Bluff, Malachite and Greenhorn. The Bluff vein is said to be 25' wide with a 12' paystreak of copper ore. The Malachite vein, 10 to 25' wide, has a paystreak of high-grade copper ore. 1½' wide at surface, increasing to 5' at depth.

Development consists of 2 tunnels, the lower or main working tunnel, 804' long. Total workings, 1,032'. Equipment includes steam and electric power plant and 10 buildings.

WISCONSIN MINING CO.

IDAHO

Office and mine: Osburn, Shoshone Co., Idaho. Jos. Bolduc, A. W. Van Gilder, Fred N. Davis, Armand Perrenoud, Louis Bolduc and Hollen N. Shultz, incorporators. Organized 1913, capitalization \$1,500,000, shares \$1 par. Company is practically the successor of the Gold Leaf Consolidated Mines and the Coeur d'Alène Consolidated Mining Co., the shares of the old companies being made transferable share for share in the new company, upon the payment of back assessments.

Lands, 4 claims, 2 to 3 miles from Wardner, have 500' of tunnels and 200' of crosscuts, developing a vein of 5 to 6' width, carrying copper ore and a little lead. Equipment includes a 2-drill compressor, run by water power from Moon creek.

WISCONSIN MONTANA MINING CO.

MONTANA

Office: Downing, Wis. Mine office: Superior, Missoula Co., Mont. A. O. Nichols, pres. and gen. mgr.; D. McDonald, vice-pres.; D. C. Coolidge, sec.; Dr. P. A. Beebe, treas., at last accounts. Organized Jan. 29, 1906, under laws of Wisconsin, capitalization \$50,000, shares 5 cts. par.

Lands, 16 claims, 320 acres, and a 5-acre mill site, in T. 15 N., R. 25 W., 1 mile from the Missoulula river and about 14 miles up the river from Superior. Property shows fissure veins cutting through limestone, slate and quartz. Two veins are under development, 1 reported to be 70' wide, having a 7' paystreak carrying azurite and chalcopyrite ore giving assays of 2 to 25% copper and estimated by the management to average 15% copper. Development is by a 24' shaft, and tunnels of 85', 700', 250' and 38', with about 100' of other laterals. Presumably idle.

WOLF CREEK COPPER MINING CO.

MONTANA

Office: Spokane, Wash. Mine office: Wolf Creek, Lewis & Clark Co., Mont. T. G. Cooper, pres.; C. E. Russell, vice-pres. and mgr.; R. E. Vincent, sec.-treas., at last accounts. The mine, developed by tunnel, is said to show a 14' vein of ore, carrying a 4' paystreak of 20 to 40% copper ore. Presumably idle.

WOLVERINE & ARIZONA MINING CO.

ARIZONA

Office: Calumet, Mich. Mine office, Bisbee, Ariz. John Daniell, pres.;

Paul P. Roehm, vice-pres.; Edw. Ulseth, second vice-pres.; W. Frank James, treas.; Chas. Chynoweth, sec.; other directors, Benj. F. Chynoweth, W. H. Brophy, Fred C. Smith and Michael J. Cunningham; W. H. Roberts, Jr, supt.

Organized 1905, under laws of Arizona, as successor of Wolverine & Arizona Development Co., capitalization \$3,000,000, shares \$15 par; issued 97,156 shares, par value \$1,457,340, subject to assessment, and 21,792 shares, par value \$326,880, of full-paid stock. Levied 25-ct. assessments March 19, 1906; Sept. 17, 1906; June 17, 1907; Nov. 18, 1907. Ended fiscal year Sept. 30, 1912, with surplus assets of \$16,370. Receipts for fiscal year 1912, included \$12,861 from sales of copper ore, with total disbursements of \$10,487. Annual meeting, second Wednesday in November.

Lands, 9 claims, 160 acres, known as the Cairo, Memphis, Kentucky, Georgia, Louisiana, Chicago, Warren, George and Broken Promise. The Georgia claim lies 600' from lands of the Calumet & Arizona, and is about 3,000' from the Irish Mag shaft of that company, and from the Spray and Holbrook shafts of the Copper Queen. The Uncle Sam and White Tail Deer claims of the Copper Queen are adjacent to the Wolverine & Arizona.

Claims lie along the high limestone ridge W. of Bisbee, extending westward to the open valley and the first development was begun on the farthestmost side of the group. The Broken Promise shaft, 700' deep, with 3 compartments, each 5'x4' 6", well timbered, cut mineralized limestone showing considerable iron but no ore in commercial quantity. A drift on the 500' level, running 850' toward the Pittsburg & Duluth group (Superior & Pittsburg Co.) cut leached ore and ledge matter, carrying traces of copper. Drifts running in other directions showed leached ore, but not in encouraging quantities, and work in this area was suspended, 1909.

Exploratory work on the western claims proving disappointing, the easternmost claims were prospected in 1906 by diamond drill and a hole 410' deep passed into 50' of 4 to 10% oxidized copper ore near the Shattuck mine. This orebody being inaccessible from the Broken Promise shaft, the use of the Higgins tunnel was acquired and the ore opened up from the Bisbee side of the mountain. The tunnel was extended 310' to the Wolverine boundary and then southerly to intersect the orebody on the Wolverine ground. This orebody proved to be a replacement deposit of rich oxidized ore, lying within the limits of the Warren claim, about 2,700' from the tunnel portal. After working out the oxidized ore down to the Shattuck boundary, exploration upward was begun and a fine body of sulphide ore was developed in the footwall limestone.

The mine has been a small but steady shipper of high-grade ore to the Douglas smelter, this ore paying all working expenses and building up a small surplus. It formerly averaged about 10% copper, but the sulphide ore is of lower grade. The mine has about 3,000' of workings and its orebodies connect downward with great stopes in the Shattuck mine, the deposit being the top of one of the ore shoots of that property. The mine is connected underground with the Uncle Sam mine of the Copper Queen Co. as well as with the workings of the Shattuck mine.

Equipment includes a 250-h. p. steam plant, 2 single-drum hoists and a 6-drill air compressor, all at the Broken Promise shaft and all unused for several years.

Production, 2,524 tons, netting \$37,962 in 1910; 984 tons, netting \$11,873 in 1911; 762 tons, netting \$12,861 in 1912. Property is excellently handled and has made this production and done its development with only 5 or 6 workmen.

WOLVERINE COPPER MINING CO.**MICHIGAN**

Office: 15 William St., New York. Mine office: Kearsarge, Houghton Co., Mich. Jos. E. Gay, pres.; J. Wheeler Hardley, sec.; John R. Stanton, treas.; Hon. E. B. Hinsdale and Samuel L. Smith, directors; Theo. Dengler, supt.; F. W. Hartmann, asst. supt.; Chas. L. Noetzel, clerk; David L. Vivian, mill supt.; Arthur Williams, mine capt.; Karl A. Mays, engr.; A. B. Holtenehoff, master mechanic.

Organized 1890, under laws of Michigan, capitalization \$1,500,000, shares \$25 par. The company owns \$80,000 stock in the Michigan Smelting Co. Fiscal year ends June 30. Adams Trust Co., Boston, registrar; American Loan & Trust Co., Boston, transfer agent. Annual meeting, first Monday in August.

The first dividend was paid Oct. 1, 1898, and 30 dividend disbursements, to end of 1913, aggregated \$7,740,000. Recent dividends, for calendar years, have been as follows: \$330,000 in 1903, \$450,000 in 1904, \$660,000 in 1905, \$1,020,000 in 1906, \$1,050,000 in 1907, \$600,000 in 1908, \$600,000 in 1909, \$600,000 in 1910, \$540,000 in 1911, \$600,000 in 1912, and \$300,000 in 1913. Net earnings for fiscal year ended June 30, 1913, were \$601,514, with balance of assets standing at \$748,034.

The Wolverine mine, opened 1882, by local capital, was unsuccessful and the company was reorganized 1890, under the present title and management, when new machinery was secured and work resumed.

Lands, 320 acres, 280 acres freehold, and 40 acres mineral rights, carry 3,100' of the strike of the Kearsarge amygdaloidal bed, on which the mine is opened. Neighboring properties are the North Kearsarge on the N., Mayflower on the E., Mayflower and South Kearsarge on the S., and Centennial on the W.

The Kearsarge bed averages about 16' in width on the Wolverine property, and this mine was for many years the richest amygdaloidal mine in the Lake Superior district, second in richness only to the Calumet & Hecla among all Lake Superior copper mines. All shafts are sunk at an angle of 41°, and skip tracks have been given crossties, in place of longitudinal stringers, following the plan introduced in the Calumet & Hecla, which unquestionably is an improvement, as it permits the use of a cheaper grade of timber and allows quicker repairs. All levels, excepting some of the very upper ones, are opened at 100' intervals. Owing to the uniformity of the cupriferous bed, all levels from the 1st to the 23d, inclusive, are opened through the entire property, connecting all 4 shafts to the bottoms of Nos. 1 and 2 and connecting Nos. 3 and 4 only below the 17th level. Man cars are installed in shafts Nos. 2, 3 and 4. About 1 mile of new openings is made yearly, with ground blocked out for about 5 years production, at the rate of 10,000,000 lbs. fine copper yearly. The life of the mine on this lode is estimated at about 10 years.

The system of underground rock handling saves confusion and cash. Tram cars to the average number of 10 are kept on each level. Trammers leave filled cars at the shaft and 2 men attend to the dumping in each shaft, these starting at the topmost level where stoping is in progress and working downward, dumping all loaded cars on each level, in order, then riding on skips to the topmost producing level and repeating the work. By this system all signaling in each shaft is in the hands of 2 men and the engineers in charge of the hoists know exactly what is going on underground.

The mine has 5 Knowles electric pumps, of which 3 are in No. 2 shaft, and 1 each in Nos. 3 and 4, 3 of these pumps having an average lift of more than 1,000' each. Current is taken from the Houghton County Electric

Light Co., and the electric pumps have given much relief to the air compressors. The mine has the Johnson electric hoisting signal system.

Exploration work by diamond drilling in the upper workings has shown good copper ore in a portion of the mine formerly considered worthless. Several parallel lodes have also been prospected, an exploratory crosscut being driven for 2,000' across the formation on the 14th level, reaching the Kearsarge conglomerate on the W., where it was barren. Another exploratory crosscut, 1,600' long, driven E. on the 28th level, intersects the Old Colony lode 1,489' E. of the Kearsarge amygdaloid and cuts other cupriferous beds. A little drifting on the Old Colony lode failed to disclose payable ground. The West lode lying 80' W. of the Kearsarge has been opened by several levels, with some payable ore on the 13th and 14th.

The Wolverine lands carry the Osceola amygdaloid over about 60 acres and a shaft was sunk 631' on this lode and 5 levels opened, but the ground was unproductive and the shaft has been abandoned.

No. 1 shaft, the northernmost, near the Kearsarge line, ran out of the tract at shallow depth, and tributary ground having been worked out, was abandoned some years ago. No. 2 shaft, next S., is permanently bottomed at the boundary line, at a depth of 1,700' and is used exclusively for handling men and supplies. The engine house has a duplex-cylinder hoist with straight-face drum.

No. 3 shaft, sunk in the footwall, is bottomed at the 38th level and can be sunk 2 additional lifts before reaching the limit of possible depth, about 4,000', an exchange of land between the Wolverine and North Kearsarge mine of the Osceola Consolidated having permitted the sinking of this shaft considerably deeper than would have been the case otherwise. Shafts Nos. 3 and 4 are connected by drifts down to and including the 33d level. Equipment of No. 3 includes a steel shaft rock house, duplicating that of Mohawk No. 4 in design and equipment. No. 3 shaft has a duplex-cylinder hoist, with a 17' straight-face drum, to permit hoisting from the maximum depth that the shaft can attain.

No. 4 shaft, sunk 45' in the foot, to guard against drawing, has reached the 37th level, and can be sunk to the 42nd level before reaching the Centennial boundary. Equipment includes an engine house, housing a 14x60" Nordberg duplex-cylinder hoist with double conical drum having a maximum diameter of 18', capable of raising 4-ton skips from 1 mile depth, with a 1¼" steel cable. No. 4 engine house has a large electric transformer. There are 20-drill and 22-drill Rand air compressors, and the boiler house has 3 Stirling water-tube boilers, with American automatic stokers and a Green fuel economizer.

The principal mine buildings are at No. 4 shaft, but there is a model changing house at No. 3 shaft. A telephone system connects underground pump stations and all buildings. The company maintains a 6-ward hospital and staff, and owns a large number of substantial dwellings, the location being exceptionally prosperous in appearance.

Rock is transported between the mine and mill by the Mohawk & Traverse Bay railroad, with a down-grade haul of 13 miles.

The mill is near the mouth of Tobacco river, on Traverse bay, Lake Superior, and adjoins the Mohawk mill, both being served by a single pump and managed by a joint superintendent. The mill, 180x206' in size, of steel on stone foundations, standing 37' above the lake, has 2 Nordberg heads. The mill uses Wilfley tables. Mineral from the heads and wash is sluiced to the basement through iron pipes, going to the works of the Michigan Smelting Co. at Houghton. A Jackson tailings plant provides for settling out the water and stacking the tailings 800' from the mill by belt conveyor.

The boiler house houses a battery of 200-h. p. Stirling water-tube boilers, equipped with American automatic stokers.

The pump house, owned jointly by the Wolverine and Mohawk, has a 20,000,000-gal. Snow horizontal triple-expansion pump, with 18", 33" and 54" steam cylinders and 22" water plungers, with 36" stroke, besides an auxiliary 8,000,000-gal. Nordberg triple expansion water-end pump, with 3 plungers. The pump house is located on the river, near its mouth, the intake being protected by timber cribs running 300' into the lake to prevent clogging from floating bark and anchor ice.

In connection with the mills there is a wharf, owned jointly by the Wolverine and Mohawk, fitted with coal hoists. The 40-acre town site of Gay near the mills, is named in honor of Jos. E. Gay, the president of the company, a man long and honorably identified with copper mining in the Lake Superior district.

Production for calendar years, was 2,316,296 lbs. copper in 1897; 4,789,829 lbs. in 1900; 9,024,034 lbs. in 1903; 9,764,455 lbs. in 1904; 9,464,418 lbs. in 1905; 9,681,706 lbs. in 1906; 9,272,351 lbs. in 1907; 9,681,706 lbs. in 1908. Production for the company's fiscal years, ending June 30, has been as follows: 1908, 9,356,123 lbs. copper; 1909, 9,995,748 lbs.; 1910, 9,757,101 lbs.; 1911, 9,617,168 lbs.; 1912, 9,408,960 lbs., and 1913, 8,350,312 lbs.

The average yield per ton of rock stamped was 26.82 lbs. in 1908, 26.75 lbs. in 1909, 24.96 lbs. in 1910, 24.75 lbs. in 1911, 23.45 lbs. in 1912, and 21.49 lbs. in 1913. The average cost per ton of rock mined since 1908 was \$1.88, and per pound of copper produced was 7.65 cts., and was \$1.86 and 8.66 cts. in 1913.

WONDERFUL MINING CO., LTD.

IDAHO

Office: Otterson Bld., Wallace, Idaho. Mine near Mullan, Shoshone Co. Idaho. A. H. Featherstone, secretary. Stock is assessable. Lands, 4 claims, patented, lying next W. of the Bullion mine, on the eastern slope of Stevens peak, have a 1,200' crosscut tunnel developing a vein said to give a fair showing of galena and copper ore.

WOODLAWN COPPER MINING CO.

UTAH

Idle. Office: 305 Atlas Bld., Salt Lake City, Utah. Mine near Brighton, Salt Lake Co., Utah. H. W. Lawrence, pres.; A. C. Ellis, Jr., vice-pres.; George N. Lawrence, sec.-treas. Organized 1899, under laws of Utah, capitalization \$500,000, shares \$1 par assessable. Lands, 7 claims, patented, in the Big Cottonwood district, 18 miles from a railroad, having 3 tunnels of 360', 980' and 100', with about 3,500' of workings, showing lead, zinc and copper ore; whose value is mainly in lead.

WOODWARD MINING CO.

NEW MEXICO

Office: Silver City, N. M. Mine office: Tyrone, Grant Co., N. M. Robert Brownell, pres.; J. I. Woodward, gen. mgr., at last accounts. Owns sundry claims in the Burro mountains, slightly developed by shaft and tunnel, planned to connect at a depth of about 500'.

Equipment includes a small steam plant with hoist, and an air compressor, and there are about 6 buildings. Idle.

WORLD'S FAIR MINE.

ARIZONA

Address: Frank and Josephine Powers, owners, Nogales, Ariz. Mine office: Patagonia, Santa Cruz Co., Ariz. Lands, 13 claims, near Harshaw, S. of Patagonia, in the eastern end of the Salero mountains. The mine has a 600' main shaft, with about 2 miles of workings, developing an 8' orebody, carrying highly argentiferous lead carbonates and sulphides near surface, changing at depth to argentiferous sulphides, with values mainly in silver.

The mine has been a shipper, since about 1893, of high-grade silver ore, in carload lots, ranging from \$250 to \$350 in value, and one 20-ton carload

gave net smelter returns of \$15,000. The property is popularly reputed to have produced about \$500,000 worth of ore. Equipment includes a steam plant. Production was 16,733 lbs. fine copper, 106,627 oz. silver and 25 oz. gold in 1907, but operations were suspended Oct. 5, 1907, on account of the low prices of silver and copper, and the mine remained idle until late 1910, when shipments were resumed and have continued more or less regularly, though on a small scale.

WYANDOT COPPER CO.

MICHIGAN

Office: 19 Congress St., Boston, Mass. Operating office: Houghton, Mich. Mine office: Winona, Houghton Co., Mich. Ashley Watson, pres.; Frederick Hoitt, vice-pres.; Chas. E. Adams, sec.-treas.; Frank L. Van Orden, mgr., and Jos. Dorr, directors; Louis LaRochelle, mg. capt. Organized Feb. 3, 1899, under laws of Michigan, capitalization \$2,500,000, shares \$25 par; paid in, \$9. Has levied assessments of \$300,000 since organization. Disbursements, for fiscal year ending March 31, 1913, were \$31,276, and the company ended its fiscal year with cash assets of \$53,704. Shares are listed on the Boston Stock Exchange. State Street Trust Co., Boston, registrar; Federal Trust Co., Boston, transfer agent. Annual meeting, second Monday in May.

Lands, 1,065 acres, adjoin the Winona, in Secs. 16, 20 and 21, T. 52 N., R. 36 W. Exploratory work, begun Feb., 1899, has been continued uninterruptedly, though hampered by the great disadvantage of a heavy overburden. Early prospect work was done in search of the Winona bed; later an attempt was made to locate the southern extension of the Baltic amygdaloid, after which attention was turned again to the Winona bed, and latterly has been confined to development work in an amygdaloidal bed, designated as No. 8 lode, lying about 2,300' E. of the Winona lode. The average strike of the Keweenaw formation on this land is N. 53° E., with an average dip of 65°, and the Wyandot lands carry the strike of the Keweenaw bedded series for about 1½ miles.

The mine has 11 shafts, some of which are merely pits, with 2 shafts of considerable depth. No. 1 shaft, 1,000' deep, located in the S. E. ¼ of Sec. 21, T. 52 N., R. 36 W., is sunk in the footwall of the Winona bed, and there is a parallel underlying amygdaloidal bed 60' distant, both broken, and of small promise, though showing occasional patches of well mineralized ground.

No. 11 exploratory shaft, 8x10', inside measurement, is sunk 710' on a stratum paralleling the Winona bed, at a distance of 1,200'. This bed gave encouragement, when first opened, and diamond-drill holes gave good cores, but proved poor under development. A crosscut was driven S. E. from the bottom of No. 11 shaft, for a distance of 2,640', intersecting 13 distinct amygdaloidal beds, of which Nos. 3 and 8 are the only ones showing copper in quantities of any promise, and considerable drifting has been done on both. No. 3 bed disclosed considerable mass and barrel copper, but No. 8 is considered the more promising.

Miscellaneous work of the past includes a 102' vertical shaft, sunk on a lean amygdaloidal bed known as the Misery River bed, in Sec. 16, T. 52 N., R. 36 W., but nothing of value was developed. Some years ago a vertical shaft was sunk on lands held under option, near the W. quarter post of Sec. 28, T. 52 N., R. 36 W., to depth of 250', and crosscuts driven both E. and W. with about one-half mile of workings. This work crossed the horizon of the Baltic bed, but what was deemed the Baltic amygdaloid was found highly altered, and worthless, as was the whole country in the neighborhood.

Extensive diamond drilling has been done, and a core, taken 1904, from the hypothetical horizon of the Lake bed, showed a little copper, but was

not considered important at that time. The ground is being gone over again with a diamond drill, the new work being done in a thoroughly systematic manner, in Secs. 16 and 21. Holes Nos. 21 and 22 showed beds offering encouragement, and some trenching was done on 1 bed, 48' wide, carrying a little copper from foot to hanging. Another trench, 1,500 N. E. disclosed the bed under only 16' of overburden, and a shaft, known as the Sec. 16 shaft, was sunk to a depth of 65'. A crosscut at this depth shows the bed to be 38' wide, carrying finely-disseminated copper for about 10', with small masses along the footwall.

Present activity is centered in development work in the No. 8 lode, 1,100' S. E. of the No. 11 shaft. This lode is opened by the long crosscut on the 700' level, and below this depth by a 115' winze, with about 500' of drifts on the 815' level. The winze discloses copper ground of fair average grade, and the possibility of developing ore of commercial value is thought to be good.

Equipment includes a steam plant with Lidgerwood hoist, good for 1,000', 1 Ingersoll-Sergeant and 2 Rand air compressors, of 12 drills aggregate capacity. Buildings include a machine shop, smithy, warehouse, barns and about 12 dwellings. The Wyandot has worked faithfully for more than a decade, under most discouraging circumstances, but with great economy and persistence, and there are at least 2 points, 1 on No. 8 bed of No. 11 shaft, and 1 in the Sec. 16 shaft, where the present showing is of an encouraging nature.

WYOMING COPPER & GOLD MINING CO.

WYOMING

Office: Alma, Kan. Letter unclaimed at former mine office, Encampment, Carbon Co., Wyo. C. B. Henderson, pres.; Al Rohr, vice-pres.; J. R. Henderson, sec.-treas. Organized Sept. 3, 1903, under laws of Arizona, capitalization \$1,500,000, shares \$1 par, nonassessable.

Lands, 9 claims, in 2 groups, known as the Metal Chief and Jessie, in Hog Park, in the upper Platte district, 12 miles from a railway. Claims show granite and gneiss, cut by 2 fissure veins with S.-E. strike, reported by the management to average 28 to 35' in width, and to carry copper oxide and carbonate ores, estimated by the management to average 3 to 15% copper, about 30 oz. silver and \$1.63 to \$3.29 gold per ton. The Metal Chief group has a shallow shaft and the vein is reported to widen at depth. The Jessie group has an 85' shaft showing ore of 5 to 10% copper tenor with small gold and silver values.

Equipment includes a small steam and gasoline plant with two 5x6" hoists and there are 3 buildings. Development has been slow for some years past, as the officers have furnished most of the funds, but a little work has been done each year ever since the company was organized.

WYOMING COPPER MINING CO.

WYOMING

Office: 303 Detroit Free Press Bldg., Detroit, Mich. Mine office: South Pass City, Fremont Co., Wyo. Charles K. Skinner, pres.; C. F. Remington, treas.; Jas. MacFarlane, vice-pres. and supt.; C. A. Spalding, sec.; preceding officers, Chas. E. Murphy and Chas. D. Ridgway, directors; Geo. N. Walker, engr. Organized 1905, under laws of Wyoming, capitalization \$2,000,000, shares \$1 par, nonassessable; issued \$1,375,000. Annual meeting, last Saturday in July.

Lands, 12 quartz claims, 240 acres, and a 30-acre placer claim, in the South Pass district of the Wind River mountains. This district was a placer gold camp about 1868. The property is reported by the management to show a strongly mineralized contact zone, between granite and metamorphic rock, proven for one-half mile length by prospect pits. Development includes a 250' incline shaft, and tunnels of 65' and 60', with 300' of workings.

The vein is reported by the company to change to sulphide ore at depth of 72', ore giving assays of 2 to 6% copper, with an average of 1 to 2 oz., and maximum of 20 oz. silver, and \$3 to \$4 gold per ton. Mine output is reported by the company to average better than 4% copper, with a trace of zinc, 1 to 16 oz. silver and \$1 to \$3.50 gold per ton.

Equipment includes an 80-h. p. boiler and a 40-h. p. Fairbanks-Morse hoist, with several buildings. The management plans deepening the shaft to 300' and continuing development.

WYOMING GOLD & COPPER MINING CO.

WYOMING

Letter unclaimed at former office, Salt Lake City, Utah. Mine office: Lusk, Converse Co., Wyo. Organized 1906, under laws of Utah. Lands, 3 claims, about 18 miles S. of Lusk, in the northern part of Albany county, said to have a 30' shaft, showing an orebody assaying 16% copper, with gold values. Idle.

YAEGER CANYON COPPER CO.

ARIZONA

Office: Union Trust Bldg., Detroit, Mich. Letter unclaimed at former mine office, Jerome, Yavapai Co., Ariz. Robert E. Plumb, pres.; Richard E. Sloan, vice-pres. and gen. mgr.; Geo. B. Russell, sec.; Geo. H. Russell, treas., at last accounts. Organized April 11, 1903, under laws of Arizona, capitalization \$800,000, shares \$1 par

Lands, 21 claims, 460 acres, 4 miles S. W. of Jerome, in the Black Hills district, carry 3 fissure veins in diorite, 1 averaging 14' width. Mine has shafts of 350' and 1,200', with about one-half mile of workings. Ores contain bornite and chalcopryrite, estimated to average 6% copper, 8 oz. silver and \$2 gold per ton. Equipment includes a 240-h. p. steam plant, with a 140-h. p. hoist and a 10-drill Sullivan air compressor. A 60-ton concentrator has a No. 2 Austin centrifugal crusher, 2 trains of rolls and 5 Wilfley and Bartlett tables. Has been a small producer at different times in past years. Company inactive.

YAK MINING, MILLING & TUNNEL CO.

COLORADO

Office: 60 Wall St., New York. Walter W. Davis, business mgr., Leadville, Colo.; John R. Champion, supt. Property at Leadville, Lake Co., Colo., is a 3-mile tunnel draining an important part of the Leadville camp and developing complex sulphide ores that carry copper as a by-product. Employs about 100 men and has electric power and haulage.

YAMPA SMELTING CO.

UTAH

Office: 747 Fifth Ave., New York. Works office: Bingham Canyon, Salt Lake Co., Utah. G. B. Schley, pres.; D. F. Sheehan, supt. Organized 1903, capitalization \$100,000, and is controlled through stock ownership by the Tintic Co.

Property is a smelter, at Yampa, in lower Bingham canyon, built 1904, and enlarged 1906, to 1,000 tons daily capacity. The works are connected with the Yampa mine by the aerial tram of the West Mountain Tramway Co. The plant includes ore bins, a calcining building, blast-furnace building, converter building and power plant, all main buildings having steel frames.

The calcining department has eight 125-ton McDougall calciners, each with 6 superimposed hearths having sets of rabbling arms and rakes, and an 18x30x30' dust chamber, connecting with a 120' brick stack.

The furnace building has 3 blast furnaces, and a main stack with extreme elevation of 287' above the tuyeres. There are also 3 reverberatory furnaces, each having separate brick stacks.

The converter department, installed 1907, has 2 stands, electrically operated, and six 84x126" shells, converting matte of 50% average tenor to blister copper, but was shut down 1909, and matte sent thereafter to the Garfield smelter. The smelter is well designed for a small plant but cannot

compete commercially with custom smelters having a wide range of ores for furnace mixtures, and there seems small likelihood of resumption. The smelter was operated for several years on the low-grade copper ore of the Yampa mine, but upon the closing of the smelting contract with the American Smelting & Refining Co., the plant was shut down, Aug., 1910, and is now for sale.

YANKEE BOY MINING CO.

IDAHO

Henry Morrill, manager; W. D. Price, lessee, Kellogg. Property leased to Big Creek Mining Co. The Yankee Boy mine is in the Big Creek section, near Kellogg, Shoshone Co., Idaho. Developed by a 700' tunnel which cuts ore at 320' from portal, carrying 500 oz. silver per ton. Equipment installed Sept., 1913, includes gasoline engine, compressor, etc.

YAQUI CANYON COPPER CO.

MEXICO

Letters unclaimed at former offices: 408 Gumbel Bldg., Kansas City, Mo., and Suaqui de Batuc, Ures, Sonora, Mex. A. J. Davies, pres.; S. M. Major, vice-pres.; W. T. Kerr, sec.; Frank B. Foster, treas.; T. W. Foster, gen. mgr. Organized under laws of Arizona, capitalization \$2,000,000, shares \$1 par.

Lands, 60 pertenencias, 148 acres, known as the Todos Santos and Great Republic mines, and a 50-acre smelter site. The property has 6 contact deposits between limestone and porphyry, of which 2, under development, of 10' estimated average width, carry copper and lead ores, former said to assay 7% copper and 50 oz. silver, and latter 15% lead and 30 oz. silver, with a trace of gold. The principal property is an antigua, supposed to be several hundred years of age, showing discarded low-grade ore on the dumps, remaining from old operations. Development is by 4 tunnels and 7 or 8 shafts, and management planned driving a new tunnel, to crosscut all known veins.

Equipment includes a steam plant, air compressor and a small smelter, with a 10-ton reverberatory furnace. Buildings include a small warehouse, laboratory, machine shop and general store. Presumably idle as the region in which the mine is located is notoriously unsafe since the Mexican revolution began.

YAQUI COPPER CO.

MEXICO

Office: 1 Madison Ave., New York. Mine office: Suaqui de Batuc, Ures, Sonora, Mex. Wm. Sauntry, pres.; Dr. A. E. Magoris, vice-pres.; Hon. Geo. E. Green, sec.-treas.; Chas. Kiser, gen. mgr., at last accounts. Organized 1902, under laws of West Virginia, capitalization \$5,000,000, shares \$1 par

Lands originally claimed to be 6,032 acres of mineral territory, and 119,284 acres of timber and grazing lands, also water rights to 25 miles of the Yaqui river, the mining lands being in the vicinity of Suaqui de Batuc, Campo Santo Nino, in the Sierra Madre, 120 miles from Hermosillo. Property is claimed to show antigua workings, iron ore and indications of coal. In June, 1906, the Montana de Cobre Co. was said to have acquired 1,000 pertenencias formerly held by the Yaqui Copper Co., hence area of present holdings is uncertain. Development, begun 1901, is by 2 shafts and 8 tunnels, and so far as can be learned the mine has shown practically no ore. Improvements include an engine and boiler house, office building and store.

The company was promoted with \$10,000 offices, magnificently furnished, in which visitors were royally entertained and given handsome ore samples. Company's literature was untruthful, its representations gross exaggerations, and its property is practically valueless. It is harmless now, but caused as much misery and harm as any mining fraud ever perpetrated. See Vol. VIII for full description.

YAQUI MINING CO., S. A.**MEXICO**

Office: Fundicion, Sonora, Mex. Geo. M. Ryall, president. Organized under laws of Mexico, and controlled through ownership of entire capital stock, by the Mexican Exploration & Mining Co., an Arizona corporation that is controlled by the Pacific Smelting & Mining Co. Property is described under latter title.

YAQUI RIVER CONSOLIDATED GOLD & COPPER CO. MEXICO

Office: Nogales, Ariz. Mine address: Imuris, Sonora, Mex. Lee Regan, mgr.; Jos. Miller, supt. Was consolidated with the Cicero Smith Mining Co., in 1911. Lands include the Mina Verde gold property in the Magdalena district, and a copper property about 25 miles E. of Imuris, latter developed by a 135' shaft, showing a 4' vein carrying auriferous and argentiferous copper ore, said to give good assay values. The Imuris property was equipped 1912, with 50-h. p. hoist, air compressor, etc., taken from the Cicero Smith property, near Wilcox, Ariz. Was developing with a small force, 1912.

YAQUI SMELTING & REFINING CO., S. A.**MEXICO**

Works office: San Antonio de la Huerta, Ures, Sonora, Mex. Is the Mexican operating company of the Sonora Mining & Development Co., and described under latter title. Fully described Vol. VIII.

YAVAPAI CONSOLIDATED GOLD-SILVER-COPPER CO. ARIZONA

Office: Prescott, Ariz. Mine office: Crown King, Yavapai Co., Ariz. Hon. Frank M. Murphy, pres.; Geo. P. Harrington, gen. mgr. Lands, 48 claims, partly patented, including the Old Reliable mine, 3 miles from Crown King; the Wild Flower group, in Pine Grove district; the Tiger group, in the Bradshaw mountains, and the Crowned King mine, in the Bradshaw mountains. The last named group, bought from B. A. Turner, receiver of the old corporation, for \$75,000, half in cash and half in shares, comprising 18 claims, has been a considerable producer, mainly of gold.

The mine has several thousand feet of old workings, showing a contact vein, between porphyry and syenite, carrying slightly auriferous and highly argentiferous copper ores, opened by a 170' shaft. Equipment includes steam power, an air compressor, 10-stamp mill and 100-ton concentrator.

YAVAPAI METALS MINING & REDUCTION CO. ARIZONA

Mine office: Prescott, Yavapai Co., Ariz. Francis S. Law, pres.; O. W. Blickenstaff, vice-pres.; A. C. Nichols, sec.-treas., 3345 A St., San Diego, Cal.; Henry Barksclub and John W. Norton, directors. Organized July, 1909, under laws of Arizona, capitalization \$1,500,000, shares \$1 par, fully paid and nonassessable; issued, 1,021,417. Annual meeting, first Tuesday in December.

Property, 14 claims, 266 acres, unpatented, in the Agua Fria district, about 7 miles N. E. of Humboldt. Claims show granite and schist with a gossan outcrop along the contact. This gossan is underlaid by oxidized copper and gold ores, the deposit having a flat dip, averaging 15° and proven on the incline to a depth of 250'. Company reports its ores to consist of red and black oxide of copper averaging 35% copper, 3.5 oz. silver and \$10 gold per ton. The orebody is said to be 6' thick and to show good sulphide ore on the 250' level.

Equipment includes a 25-h. p. hoist and several mine buildings.

A recent shipment of 12 tons is reported by management to have averaged \$65 per ton.

YELLOW BUTTE COPPER CO.**CALIFORNIA**

Mine office: Weed, Siskiyou Co., Cal. Hon. W. P. Veuve, pres.; Dr. J. D. Ball, sec.; Dr. P. A. Jordan, treas.; L. D. Ball, gen. mgr.; J. D. Hubbard, supt. Organized 1907, under laws of Arizona, capitalization \$1,500,000,

shares \$1 par, nonassessable. Lands, 320 acres, on the eastern slope of Haystack mountain, 12 miles N. of Mount Shasta and 12 miles from Edgewood. The property has a fissure vein in granite carrying malachite at and near surface, succeeded by bornite and chalcopryite, with quartz gangue, developed by 2 shafts, of which No. 1 is 350' deep. Improvements include a 12-h. p. gasoline hoist, with an engine house, boarding house, bunkhouse and smithy. A little ore was shipped, early 1908, to the Kennett smelter.

YELLOW TIGER MINING CO.

NEVADA

Mine office: Goldfield, Nev. J. W. Bates, general manager. Lands, next S. of the Goldfield Consolidated and E. of the Columbia Mountain fault, show a vein of 18" to 2' width developed to a depth of 700' by shaft with several hundred feet of openings. Ores are said to carry from 6 to 9% copper, and gross values reported as from \$25 to \$32 per ton, are apparently mainly in this metal. About \$100,000 has been spent in development work. Was developing and preparing to ship ore to the Mason Valley smelter, late 1913.

YELLOWSTONE MINE.

MONTANA

Mine address: Clancy, Jefferson Co., Mont. The property comprises 10 or 11 claims, on a small stream, tributary to Clancy creek, 5 miles W. of Clancy. Claims show a 25' fissure vein in quartz monzonite, with E.-W. strike, dipping 65° S., and apparently cutting across a dacite dike of 90' width. Ore minerals are mainly chalcopryite and galena, with smaller amounts of sphalerite and pyrite.

The mine has a 90' shaft and a drift tunnel, 200' long, at last reports.

YERINGTON BULLION COPPER CO.

NEVADA

Mine address: Ludwig, Lyon Co., Nev. The mine, 2 miles N. of the Nevada-Douglas property, has shafts of 400', 116' and 30', and 2 tunnels, one 300' E. and the other 300' W. of the main shaft. Ores are copper with small gold values.

Equipment includes a 40-h. p. gasoline engine with air compressor, and a 15-h. p. hoist.

YERINGTON CENTRAL COPPER CO.

NEVADA

Address: Herbert M. Wells, sec., Salt Lake City, Utah. Mine office: Yerington, Lyon Co., Nev. W. Mont Ferry, president. The company had a floating indebtedness late 1912, of \$64,526, and was in danger of losing its property to its creditors, as stockholders did not send in their proxies permitting stock to be made assessable. The mine has a 250' three-compartment shaft, showing a 3 to 5' vein carrying chalcopryite, claimed to assay about 10% copper, with a 4" hanging-wall paystreak of melaconite giving assays up to 59.1% copper. Idle several years, except for annual assessment work, practically bankrupt and reorganization inevitable.

YERINGTON CONSOLIDATED COPPER CO.

NEVADA

Office: 701 McIntyre Bldg., Salt Lake City, Utah. Mine office: Mason, Lyon Co., Nev. Frank J. Hagenbarth, pres.; M. B. Johnson, sec.; John Dern, treas.; preceding officers, J. H. Turner and J. H. Mays, directors. Organized Feb. 11, 1907, under laws of Utah, capitalization \$5,000,000, shares \$5 par, nonassessable; issued, 725,000 shares. Debentures, \$100,000 at 6%, authorized. Annual meeting, second Monday in July.

Lands, 14 claims, patented, in 2 groups, known, as the Copper King and Copper Deposit, the former, lying between the Bluestone and Mason Valley mines, developed by a 70' shaft and 2 tunnels of 500' and 600', showing carbonate ores.

YERINGTON COPPER MERGER MG. & SMELTING CO.

NEVADA

Idle. Mine address: Yerington, Lyon Co., Nev. A. J. McDaniel, general manager, at last accounts. Organized 1910, capitalization \$5,000,000,

assessable. The company is a merger of different properties. Lands, 28 claims, 550 acres, in the Buckskin district, slightly developed.

YERINGTON COPPER MOUNTAIN MINING CO. NEVADA

Office: 302 Hooper Blk., Salt Lake City, Utah. Mine office: Yerington, Lyon Co., Nev. A. Hanauer, Jr., pres.; Wm. H. Tibbals, vice-pres.; J. H. Turner, sec.-treas. and gen. mgr.; preceding officers, Isaac Sparey, L. A. Mehse and C. W. Hooven, directors. Organized April 25, 1907, under laws of Utah, capitalization \$1,000,000, shares \$1 par, nonassessable; issued, \$700,000.

Property, 10 claims, unpatented, about 200 acres, 4 miles from a railway, in the Mason district, shows porphyry carrying a vein with N.-E. strike and westerly dip, of 1 to 30' width, opened by surface trenching and short tunnels. Development includes a 150' shaft sunk on the vein and showing 8 to 18" of ore throughout. A 50' perpendicular shaft cut ore 3' wide averaging 6% copper for 35' below the surface, where vein left shaft. A crosscut at the bottom of this shaft cut similar ore in the vein. Idle except for annual assessment work.

YERINGTON IRONSIDES COPPER CO. NEVADA

Office: 302 Hooper Blk., Salt Lake City, Utah. A. Hanauer, Jr., pres.; Wm. H. Tibbals, vice-pres.; J. H. Turner, sec.; J. P. Spaulding, treas.; preceding officers, Moritz Bamberger and Chas. T. Rooklidge, directors; T. L. Walden, supt. Organized Nov., 1906, under laws of Utah, capitalization \$1,000,000, shares \$1 par, nonassessable.

Lands, 7 claims, unpatented, 140 acres, N. of the Nevada-Douglas mine and 5 miles N. W. of Yerington, having numerous pits and trenches, with a tunnel on the Ironsides claim, and a shaft of about 200' depth, with about 600' of workings, showing ore said to average 5 to 8% copper. Sufficient work has been done each year to keep the title good.

YERINGTON MALACHITE COPPER CO. NEVADA

Office: 414 Judge Bldg., Salt Lake City, Utah. Mine office: Yerington, Lyon Co., Nev. Grant Snyder, pres. and gen. mgr.; H. J. Mayer, vice-pres.; Gidcon Snyder, sec.-treas.; other directors, S. M. Levy and W. T. Snyder; E. L. Riggs, supt. Organized Oct., 1906, capitalization \$5,000,000, shares \$5 par, assessable; issued, 666,333 shares.

Lands, 11 claims, patented, adjoining the Mason Valley mine, show 3 mineralized zones of 20 to 150' width, proven on surface for a distance of 2,000'. Orebodies are fissure veins in limestone, carrying oxidized ores to a depth of about 100' below which ore minerals are mainly chalcopryrite, associated with epidote and garnet.

The property is opened by numerous short tunnels and pits, a 600' tunnel, and a 140' three-compartment shaft, with about 2,000' of workings connecting on the vein with the Mason Valley workings through which considerable development was secured 1912-13. Ores as mined average about 6% copper.

Equipment includes a 125-h. p. General Electric motor, a steam hoist good for 600' depth, a Rand Imperial air compressor, and a 7x10" Hendrie & Bolthoff hoist. Electric power is taken from the Truckee River Power Co. There are several mine buildings.

Production was begun May, 1912, and company was shipping regularly to the Mason Valley smelter, early 1913. Property considered promising.

YERINGTON MINES & EXPLORATION CO. NEVADA

Office and mine: Yerington, Lyon Co., Nev. Sam'l Anderson, pres.; Edgar Yates, vice-pres.; C. S. Durand, sec.-treas. and gen. mgr.; other directors, W. A. Hervey and C. Straesser. Organized Feb. 27, 1909, under

laws of Nevada, capitalization \$1,000,000, shares \$1 par, nonassessable; issued, \$715,000.

Lands, 24 claims, including the Effie May group of 2 gold claims, the Copper Flat group of 10 copper claims, and the Mohawk group of 12 gold-copper claims, latter being the principal property, located 1 mile N. W. of Yerington.

The Mohawk group is developed by a 70' incline and several shallow shafts of 20' average depth, sunk in the copper-bearing formation. A 115' vertical and 3 incline shafts of 40', 80' and 80' have been sunk on gold-bearing veins, of which 1, of 7' width, is said to have given assays of \$200 per ton. The copper veins are reported to carry malachite and chalcopryite with about 6% copper.

The Copper Flat group, 1 mile E. of Yerington, is developed by about 20 pits and shallow shafts, deepest 60', showing malachite and cuprite of about 6% copper tenor.

The Effie May group is a gold prospect developed by a 135' shaft, said to show \$50,000 in ore blocked out for stoping. Property is on the Nevada Copper Belt railway.

YERINGTON MOUNTAIN COPPER CO.

NEVADA

Office: Tonapah, Nev. Mine office: Schurz, Mineral Co., Nev. John G. Kirchen, pres.; Key Pittman, vice-pres.; P. D. Booth, sec.-treas.; E. J. Haug, supt.; George Jones, mine supt.; J. H. Tate, engr. Organized 1912, under laws of Nevada, capitalization \$3,000,000, shares \$1 par, nonassessable; issued, \$1,250,000. First National Bank of Tonapah, Nev., registrar and transfer agent.

Lands, 33 claims, 680 acres, in the Mountain View district, 9 miles N. W. of Schurz and about 12 miles E. of Yerington.

The property shows 2 fissure veins, in grano-diorite, bearing N. 40° E., and dipping 65°. The veins range from 8 to 20' in width. Ore minerals are mainly chalcocite, with chalcopryite, chrysocolla, malachite, cuprite and occasional native copper.

Development is by a 500' main shaft, and 3 tunnels of 650', 750' and 950', with about 5,000' of openings. A crosscut below the Levine tunnel is developing a good body of ore. Openings in the Azurite tunnel disclose ore in bunches and streaks. The Beach tunnel is yielding a good grade of shipping ore of about 5.5% copper.

Equipment includes a 25-h. p. gasoline hoist, and 11 buildings. Company was said, Oct., 1913, to plan installing an aerial tramway.

YORK HARBOUR MINE.

NEWFOUNDLAND

Mine address: York Harbour, Birchy Cove, Bay of Islands, N. F. The mine, at the head of Eagle Nest brook, about 4,000' from the bay, at an elevation of about 1,000' above tide water, carries cupriferous pyrite, giving assays of 3 to 18% copper, with occasional zinc, up to 50% sulphur, 0.5 to 4 oz. silver and 40 cts. to \$1.40 gold per ton. The ore is compact and close-grained with average values of 4.5% copper and 38 to 41% sulphur, the sulphur being valuable for use in the manufacture of acid after the extraction of copper values. Development is by shafts of 54', 64', 70' and 360', with about one-half mile of workings. The 360' main shaft is sunk at an angle of 72° to the S. E., practically the same as the dip of the ore lenses. Levels are opened at 60' intervals, with drifts driven S. W., along the strike of the orebodies. Extraction was carried on by overhead stopes, averaging 10 to 30' in width, and timbering is with 12x12" sticks, in square sets.

The shaft house has a crusher of 500 tons daily capacity, reducing ore to 6" size, whence it goes into cars on the main tramway, 5,400' long, with an elevation of 1,000', having a 36" gauge track, trains consisting of two 3-

ton self-dumping steel cars, which are lowered by a hoist and deliver ore into a 2,000-ton pocket on the bay, to a double-tracked tunnel, both sides of which are fitted with chute gates connecting with the superstructure of the pier, over which 1-ton cars are trammed, delivering ore into the hold of the steamer. Loading facilities are equal to handling about 700 tons daily.

Equipment includes a 250-h. p. steam plant, with a 50-h. p. Flory hoist and an 8-drill Norwalk high-altitude air compressor. Buildings include an engine house, boiler house, sawmill and 15 dwellings. Inactive.

YOSEMITE MINES CO.

UTAH

Office: 60 Congress St., Boston, Mass. Operating office: 404 Dooly Bldg., Salt Lake City, Utah. Mine address: Bingham Canyon, Salt Lake Co., Utah. Jas. T. Graves, pres.; Sydney S. Millett, sec.-treas.; Imer Pett, gen. mgr. Organized Aug., 1909, under laws of Maine, capitalization \$1,000,000, shares \$1 par, and is controlled by the Bingham Mines Co. through ownership of a large share interest.

Lands, 12 claims, patented, including the Yosemite group of 6 claims, the Cluster group of 5 claims, and the Mississippi claim, adjoining. The properties are said to have produced upwards of \$1,000,000 in gross values, mainly in silver-lead ore, under previous ownership, and the mines were considerable lead producers as early as 1892. The lands lie N. and W. of the Dalton & Lark group of the Bingham Mines Co., and carry approximately 2,400' of the strike of the Lark vein.

Principal development is in the Yosemite No. 1 mine, opened by an incline shaft connecting with the Mascotte tunnel on the 2,220' level, thus opening up a large amount of virgin ground. The Cluster group is developed by the 1,650' Paradox tunnel, showing lead ore. Values developed are mainly in silver-lead, but some copper ore is shown, especially below water level, and some chalcopryrite of good grade, associated with pyrite, is found on the 800' level. The mine is quite wet. Equipment includes a power plant and air compressor.

YUCCA-ARIZONA COPPER CO.

ARIZONA

Address: 506 Broadway, Central Bldg., Los Angeles, Cal. Mine, 20 miles from Yucca, on the A., T. & S. Fe R. R., in Mohave Co., Ariz. S. J. Haynes, pres.; C. H. Post, vice-pres.; H. Leon Haynes, sec.; preceding officers, W. S. Bullis and W. H. Dann, directors. J. C. Ashton, supt.; Llewellyn E. Humphries, mg. engr. Organized Jan. 20, 1911, under laws of Arizona, capitalization \$2,000,000, shares \$1 par; 525,000 issued. Annual meeting, third Monday in January.

Property, 15 claims, 12 owned, 3 bonded, 320 acres, with 2 mill sites and 2 water rights. Lands show granite and porphyry with 6 veins, the main ledge under development averaging 3' thick, proven for 3,000' along the outcrop and to a depth of 130'. Ore carries oxidized copper minerals, chalcopryrite and copper glance and is reported to average 11.85% copper.

Development includes 183' shaft, with 86' crosscut on 130' level cutting ore; underground work totals 493'. Equipment includes small gasoline hoist and temporary buildings. Company expects to install new hoist and compressor early 1914, and to sink shaft to 500'.

YUKON DISTRICT GOLD MINES DEV. CO.

YUKON

J. H. Conrad, manager, Carcross, Yukon Territory, Canada. Property, the Venus group, shows veins carrying silver and gold-bearing lead-copper ore. Development by tunnels. Equipment includes steam and hydraulic power plants, air compressor and 50-ton concentrator.

ZACUALPAM, S. A.; CIA. MINERA.

MEXICO

Mine office: Zacualpam, Sultepec, Mexico, Mex. Organized 1907, under laws of Mexico, capitalization 500,000 pesos, shares 100 pesos par, in

1,500 full-paid shares and 3,500 shares with 20 pesos paid in. Mines are the San Agustin y Anexas, carrying veins yielding ores of various metals. Idle.

ZAMBONA DEVELOPMENT CO. MEXICO

Letters unclaimed at former office: 314 American National Bank Bldg., Los Angeles, Cal. Mine office: Minas Nuevas, Alamos, Sonora, Mex. R. R. Coleman, pres. and treas.; Wm. S. Cranz, vice-pres.; C. W. Hayes, sec.; Amos J. Yaeger, gen. mgr.; preceding officers, Bracey Curtis, W. Molten Clark, W. F. Bottsford, Stanley Hirschbaum, L. R. Patterson and Dr. Ray Ferguson, directors; Ernest J. Koch, supt.; Ramon Paez, mine supt., at last accounts.

Property includes the Zambona, Purisima and San Antonio mines, said to have produced about \$7,000,000 worth of ore, in the past, carrying native silver, argentite and chalcocite, with values largely in silver. The mine is developed to depth of 730', and has a long crosscut tunnel, planned to be driven 2,000', with a double track. There remain about 200,000 tons of low-grade disseminated ore on the dumps, available for milling and cyaniding.

Equipment includes a steam and electric plant, a 30-stamp mill having 4 Huntington mills and 3 tube mills, and a 100-ton cyanide plant.

ZELLA MINING CO. UTAH

Office: Walker Bros. Bank, Salt Lake City, Utah. M. H. Walker, pres.; Oscar K. Lewis, vice-pres.; L. H. Farnsworth, sec.-treas. Organized 1910, under laws of Utah, capitalization \$100,000, shares \$2 par. Lands include property at Ophir, Tooele Co., in the Blue Ledge district of Wasatch county, and in Little Cottonwood district, near Alta, Salt Lake county, Utah. All properties are idle, apparently since organization.

ZENOLI SILVER-COPPER CO. NEVADA

Office: 17 West Second South St., Salt Lake City, Utah. Mine office: Palisade, Eureka Co., Nev. H. A. Pederson, pres.; John A. Kirby, vice-pres.; Henry I. Cobb, sec.; R. K. Cobb, treas.; preceding officers, Hyrum Hayball, H. Bullen, Jr., and W. M. Wantland, directors, at last accounts. Organized 1907, under laws of Nevada, capitalization \$500,000, shares \$1 par, assessable. Has levied 2 assessments, and paid a dividend of \$4,400, Dec., 1908.

Lands, 32 claims, surveyed for patent, in the Safford district, 1 mile from a railway, opened by a 600' tunnel, with about 1 mile of workings, developing a vein of 2 to 6' wide, carrying silver-lead ore at surface, changing to silver-copper ore at depth, assaying up to 204 oz. silver per ton. A little ore was shipped, 1907-08, returning about \$10,000, but work has been confined mainly to development. There are necessary mine buildings. Inactive.

ZETTA BLANCHARD MINE. NEVADA

Mine address: Contact, Elko Co., Nev. McArdle, et al., owners. Property shows a 16' vein of copper-bearing ore upon which considerable development work has been done with indications that the mine will make a profitable producer.

ZOMELAHUACAN, S. A.; CIA. MINERA DE. MEXICO

Mine office: Las Minas, Jalacingo, Vera Cruz, Mex. W. Vogel, manager at last accounts. Organized 1893, under laws of Mexico.

Lands include La Ascuncion de Maria y Anexas, El Alto and Espiritu Santo y Anexas mines, near the village of Las Minas, about 110 miles N. W. of Vera Cruz. The mines are remote from roads and railroads and receive supplies by pack animals. El Alto, the principal mine, has been a considerable producer in the past of copper and lead ores. Ore found at depth is chalcocopyrite, averaging 1.5 grams gold per metric ton to each unit of copper, and ore shipped after selection ranges 12 to 25% in copper tenor, nothing under 10% standing the heavy cost of shipment. The dumps con-

tain several thousand tons of low-grade material, averaging 3.5% copper and 2 to 6 grams gold per metric ton. Equipment includes water power and a 10-stamp mill, and the mine employed about 150 men, at last accounts.

ZONIA MINE.**ARIZONA**

Mine address: Zonia, via Kirkland, Yavapai Co., Ariz. Property, near Placeritas, was under development at various times by different companies, including the Zonia Copper Mining Co., which failed, and the Mines Development Co., which did a little churn drilling with disappointing results which led it to abandon the property.

ZUMA MINING & MILLING CO.**UTAH**

Office and mine: Eureka, Juab Co., Utah. Michael L. Garity, pres.; Rasmus Nelson, vice-pres.; P. J. Fennell, sec.; J. E. Driscoll, treas. Organized 1907, capitalization \$500,000, shares 50 cts. par.

Lands, 6 claims, 4 patented, in the vicinity of the Crown Point and Iron King mines, developed by a 200' shaft. Equipment includes steam and electric power, with an air compressor. Presumably idle.

PART II.

GEOGRAPHICAL INDEX.

A list of all North American copper mines and mining companies, including United States, Canada, Newfoundland and Mexico, arranged by states, districts and towns:

UNITED STATES.

Companies operating at many localities in the United States.

American Metal Co., Ltd.
American Sm. Sec. Co.
American Sm. & Ref. Co.
General Development Co.
Guggenheim Expl. Co.
International Metals Selling Co.
International Nickel Co., The
Metallurgical Co. of America.
Phelps, Dodge & Co., Inc.
United Copper Co.
United States Sm., Ref. & Mg. Co.

Alabama.

CLAY

Pyriton

Southern Sulphur Ore Co.
Standard Copper Pyrites Co.

Alaska.

BARANOF ISLAND

Sitka

Gila Copper River Mines Co.

CAPE NOME

Nome

Copper Mountain Copper Co.

CHITINA

Alaska Westover Copper Co.

Elliott

Hubbard-Elliott Copper Co.

COPPER RIVER

Copper Center

Alaska-Calumet Copper Co.

Alaska Cons. Copper Co.

Alaska Copper & Coal Co.

Alaska Copper Corp.

Blackburn Mines Co.

Bonanza Mine.

Kansas Copper Co.

Kuskalina (Kuskatama) Mine.

Rarus Group.

Dan Creek

Alaska United Copper Expl. Co.

Kennecott

Houghton Alaska Ex. Co.

Kennecott Mines Co.

Mother Lode Cop. Mines of Alaska.

Regal Mines Co.

Kotsina

Great Northern Dev. Co.

COPPER RIVER (Continued).

Nizina

Dan Creek Gold & Copper Co.

ILLIAMNA LAKE

Illiamna

Alaska Gold & Copper M. Co.

Alaska-Illiamna Copper Co.

KUPREANOF ISLAND

Petersburg

Kupreanof Copper Mg. Co.

Kupreanof Copper M. & S. Co.

MT. M'KINLEY

Cheshnina

Cheshnina Mines Copper Co., Inc.

PRINCE OF WALES ISLAND

Baldwin

Cymru Copper Co.

Coppermount

Alaska Cons. M. & S. Co.

Copper City Mine.

United Metals Co.

Dolomi

Alpha Mining Co.

Northland Development Co.

Hetta Inlet

Alaska Metals Co.

Kasaan

Goodro Mining Co.

Hydah Copper Co.

It Mining Co.

Mount Andrew Iron & Copper Co.

Mount Andrew Mining Co.

Rush & Brown Group

Ketchikan

Brown Alaska Copper Co.

Nestor Mining Co.

Northland Copper-Gold Group.

Red Wing Mine.

Uncle Sam Copper Co.

Unuk River M. & S. Co.

Victory Copper Mg. Co.

Kiam

Omar Mining Co.

Niblack

Niblack Mine.

Sulzer

Alaska Industrial Co.

Beaver Mountain Mining Co.

Gould Island Mine.

Jumbo Mine.

PRINCE WILLIAM SOUND

Ellamar

Dickey Copper Co.

Ellamar Mining Co.

Fildalgo-Alaska Copper Co.

Gladhaugh Mine.

PRINCE WILLIAM SOUND (Continued).

Landlock

Chisna Cons. Mines Co.
Hemple Copper M. Co.
Landlock Bay Copper Mg. Co.
Standard Copper Mines Co.
Three Friends Mine
Three Man Mining Co.

Latouche

Beatson Copper Co.
Bonanza Mine
Girdwood Mine
Latouche Copper Mg. Co., Ltd.
Latouche Id. Copper Mg. Co.
Northern Light Dev. M. Co.
Reynolds-Alaska Dev. Co.
Seattle-Alaska Copper Co.

Valdez

Cliff Copper Mine
Galena Bay Mining Co.
Great Britain Group
Knight's Island-Alaska Copper Co.
Knight's Island Cons. Copper Co.
Knight's Island Copper Mg. Co.
Knight's Island M. & Dev. Co.
Midas Copper Co.
Snug Harbor Copper Co.
Twentieth Century Alaska Cop. Co.
Twentieth Ct. Knight's Id. Cop. Co.
Wells Bay Co. of Alaska

Arizona

COCHISE

Benson

Blue Lead Co.
Boston & Arizona Smelting Co.
Hub Mining Investment Co.
Rosario Mine
Valenzuela Copper Mg. Co.

Bisbee

Bisbee Coalition Mining Co.
Bisbee & Duluth M. & Dev. Co.
Bisbee Extension Mg. Co.
Calumet & Arizona Mining Co.
Calumet & Bisbee Dev. Co.
Cochise Dev. Co.
Copper Glance Mg. Co.
Copper King Mine
Copper Queen Cons. Mg. Co.
Denn-Arizona Copper Co.
Empire State Mining Co.
Higgins Leasing Co.
Marquette & Arizona Mining Co.
Modern Copper Mining Co.
Portage Lake & Bisbee Mining Co.
Sacramento Mine
Shattuck-Arizona Copper Co.
Superior & Pittsburg Copper Co.
Union Mines Co.
Warren Realty & Development Co.
Wolverine & Arizona Mining Co.

Divie Canyon

Mountain View Development Co.

Dos Cabezas

Mascot Copper Co.
Sterling Copper Co.
Sunset Mining & Milling Co.

Douglas

Atlas Exploration & Mining Co.
Douglas Smelter
Texas Group

Dragon

Arizona Copper Shipping Mines Co.
Centurion Arizona Mining Co.
Empire Copper & Gold Mining Co.
Fairview Mining Co.
Great Western Gold & Silver Co.
Inspiration Mining Co.
Red Mountain Development Co.
Teter-Stone Azurite Mining Co.
Texas-Arizona Mining Co.

COCHISE (Continued).

Gleeson-Courtland

Arizona Gold & Copper Mining Co.
Copper Belle Mine
Copperox Mining Co. of Arizona
Great Western Copper Co.
Heffern Mining & Development Co.
La Expositicon Mining Co.
Leadville Mining Co.
Leonard Copper Co.
McKittrick Mine
Tejon Mining Co.

Hamburg

Hartford-Arizona Copper Mining Co.

Hereford

Butte & Arizona Copper Mining Co.

Ft. Huachuca

Princeton Copper Mg. & Sm. Co.

Johnson

Arizona & Michigan Dev. Co.
Arizona United Mining Co.
Black Prince Copper Co.
Cochise Copper Co.
Johnson Copper Development Co.
Keystone Copper Mining Co.
Lime Mountain Copper Co.
Magazine Mining Co.
Peabody Copper Mining Co.
Peacock Copper Co.
Peoples Party Mining Co.
Republic Mining Co.

McNeal

Swisshelm Mountain Mining Co.

Middlemarch

Middlemarch Copper Co.
Santa Ana-Arizona Mining Co.

Naco

Naco Smelting & Refining Co.

Paradise

Badger-Hall Mining Co.
Bernoudy-Turkey Creek Co.
Big Springs Mining Co.
Bisbee-Sonora Development Co.
Duluth & Chiricahua Dev. Co.
Nebraska & Arizona Copper Co.
Paradise Mining Co.
Providence Copper Co.
San Simon Copper Co.
Savage Gold & Copper Co.
Scanland Mine
Sullivan Development Co.
Whitetail Copper Mining Co.

Pearce

Hayes & Gracey Syndicate
Little Mary Mining Co.

Petal

Virtue Mining & Development Co.
Willie Rose Copper Mining Co.

San Simon

Arizona Rio Tinto Mining Co.
Pawnee Mining Co.

Tombstone

Boston-Mexico Mines Co.
Development Company of America
Mabel Copper Co.

Tyndall District

Royal Blue Mine

Wilcox

Kin-e-chy Mining & Milling Co.
Mascot Mining Co.

COCONINO

Grandview

Canyon Copper Co.

GILA

Globe

American Copper Co.
Apache Consolidated Copper Co.
Arizona-Cananea Mines Corporation
Arizona Commercial Mining Co.
Arizona National Copper Co.
Banner Copper Co.
Barney Copper Co.

GILA (Continued).

Globe

Bell-Dominion Copper Mining Co.
 C. B. S. Mining Co.
 Chrisman & Globe Mining Co.
 Clark & Taylor Group
 Cole Development Co.
 Copper & Silver Zone Mines
 Cordova Copper Co.
 Dixon Copper Co.
 Duquesne Mining Co.
 German Copper Co.
 Globe, Arizona & El Paso Copper
 Mng. & Smelting Co.
 Globe & Lost Gulch Silver-Copper
 Mines Co.
 Globe Mining Co.
 Interstate Exploration Co.
 Iron Cap Copper Co.
 Keystone Mine
 Kingston Mine
 Little Miami Copper Mines Co.
 Louis D'Or Gold Mining Co.
 Manitou Hill Copper Co.
 McMillen-Stonewall Mining Co.
 Merrimac Mining Co.
 Miami Arizona Development Co.
 Mineral Farm Development Co.
 Moctezuma Mine
 New Dominion Mines Co.
 Old Dominion Co.
 Old Dominion Copper Mg. & Sm. Co.
 Pinto Copper Mining Co.
 Radium Mines Co.
 Sombrero Development Co.
 Southwestern Miami Dev. Co.
 Superior & Boston Copper Co.
 Superior & Globe Copper Co.
 Uneeda Mining Co.
 Union Copper Co.
 United Globe Mines

Miami

Black Warrior Mine
 Castle Dome Mine
 Copper Dollar Mining Co.
 Gibson Copper Co.
 Globe-Ray Development Co.
 Inspiration Cons. Copper Co.
 Inspiration Copper Co.
 Inspiration Extension Copper Co.
 Inspiration Needles Copper Co.
 Jahnville Mining Co.
 Jordan Group
 Miami Copper Co.
 Miami Inspiration Mining Co.
 Miami Needles Copper Co.
 Montezuma Copper Mining Co.
 New Keystone Copper Co.
 New State Copper Mining & Sm. Co.
 Orphan Copper Co.
 Rose, John
 Sleeping Beauty Copper Co.
 South Live Oak Development Co.
 Summit Copper Co.
 Walnut Grove Group
 Warrior Copper Co.
 Warrior Development Co.

Payson

Mazatzal Copper Co.

San Carlos

Arizona Lead-Silver-Copper Co.
 Cobre Grande Mines
 Copper Reef Consolidated Mines
 Tri-Bullion Smelting & Dev. Co.

Winkelman

Antelope Peak Mining Co.
 Arizona Cons. Gold & Copper Co.
 Arizona Gold & Copper Co.
 Ball Copper Co.
 Central Mining & Development Co.
 Gila Copper Sulphide Co.
 Idaho Group
 London Arizona Cons. Copper Co.

GILA (Continued).

Globe

London-Arizona Copper Co.
 London-Gila Mining & Power Co.
 London Mountain Copper Co.
 London-Range Copper Co.
 London-Shamrock Copper Co.
 Overland Mining Co.
 Saddle Mountain Mining Co.
 Vekol Range Copper Co.

GRAHAM

Aravaipa

Grand Reef Mine

Bonita

Michigan-Arizona Copper Co.
 Copper Creek

Minnesota-Arizona Copper Co.

Ft. Grant

Advance Mining Co.

Lone Star

Mountain Copper Co.

Safford

Arichise Copper Co.

Lone Star Cons. Copper Co.

Solomonville

Buena Vista Copper Mining Co.

GREENLEE

Clifton-Morenci

American Celtic Copper Co.
 Arizona-Celtic Copper Co.
 Arizona Cons. Copper Mines, Ltd.
 Arizona Copper Co., Ltd.
 Arizona-Morenci Copper Co.
 Chase Creek Copper Co.
 Clifton Gold & Copper Co.
 Coronado Mining Co.
 Cuprite Copper Co.
 Detroit Copper Mg. Co. of Arizona
 Eagle Gold & Copper Mining Co.
 Gila Mountain Copper Co.
 Gold Belt Dev. & Reduction Co.
 Home Copper Co.
 Irish Mines.
 Missabe-Morenci Development Co.
 New England & Clifton Copper Co.
 New York-Arizona Gold & Cop. Co.
 Polaris Mining & Milling Co.
 Shannon Copper Co.
 Sierra de Oro Gold Mg. & M. Co.
 Stevens Copper Co.

MARICOPA

Agua Caliente

Hauxhurst Mine

Cave Creek

Arizona & Chicago Mining Co.
 Fortuna Gold & Copper Co.
 Grand Traverse & Arizona Mg. Co.
 Hualapai Mining Co.
 Oriental Copper Co.
 Rogers-Arizona Mining Co.
 Rogers Springs Mining & Sm. Co.

Gila Bend

Rowley Copper Mines Co.

Glendale

Eddy Gold, Silver & Copper Mg. Co.

Mesa

Carney Mining Co.

Morristown

Arizona-Vermont Copper Co.
 Buffalo & Arizona Mining Co.
 Francis, Chas.
 Maricopa Mines Co.

Ophir Group

Rio Tonto Mining & Milling Co.

Phoenix

Copper Top Mine
 Exposition Mining Co.; La.
 La Regina Copper Co.
 Palo Verde Copper Co.
 Red Rover Copper Mining Co.
 Slocum Copper Co.

Wickenburg

Arizona Gold Mines Co.

MARICOPA (Continued).

Wickenburg

Arizona Mines Co.
 Arizona Prospecting & Dev. Co.
 Black Rock Mining Co.
 College Mine
 Congress Consolidated Mines Co.
 Eagle Copper-Gold Mining Co.
 Heckley Gold & Copper Mining Co.
 Mars Consolidated Co.
 Monarch Mining & Smelting Co.
 Morse Consolidated Copper Co.
 Ohio & Tennessee Mining Co.
 Oro Grande Mines Co.
 Unida Gold & Copper Mining Co.

MOHAVE

Bentley

Grand Gulch Mining Co.

Cedar Valley

Sapphire Gold & Copper Co.
 Smith, Sawyer & Co.
 Southwestern Copper Co.

Chloride

Midnight Mine
 Needles Mining & Smelting Co.
 Rainbow Mountain Mining Co.
 Redemption Copper Mining & M. Co.
 Tennessee Mines
 Utah-Arizona Gold & Copper Mfg. Co.

Hackberry

Copper Giant Mine
 Loper & Carney
 Nevada-Arizona Mines Co.

Kingman

Arizona Alpha Mining Co.
 Arizona Le Roi Copper Mining Co.
 Arizona Turquoise Mines Co.
 Arizona Venture Corporation
 Aztec Turquoise Co.
 Copper Canyon Mine
 Enterprise Mining, Red. & Imp. Co.
 Kingman Copper Mining & Mfg. Co.
 Los Angeles Gem Co.
 Mineral Mining Co.
 Oro-Plata Mine
 Walnut Creek Mining & Milling Co.
 Wauba Yuma Mine

Yucca

Arizona-Southwestern Copper Co.
 Yucca-Arizona Copper Co.

NAVAJO

Cedar Springs

Graham County Copper Co.

PIMA

Ajo

Ajo Consolidated Copper Co.
 Colonial Copper Co.
 New Cornelia Copper Co.

Arivaca

Madera Mining Co.
 Santa Rita Copper Mng. & Sm. Co.

Cerro Colorado

Baker Consolidated Copper Co.

Comobadi Mnts.

Columbia Mine

Corwin

Girard Development Co.

Helvetia

Black Diamond-Isabel Group
 Evalene Mine
 Helvetia Copper Co.
 Michigan & Arizona Dev. Co.
 New York Copper Mng. & Sm. Co.
 Old Baldy Mine
 Peach Mine
 Rosemont Copper Co.
 Tip Top Copper Co.

Pantano

Empire Mining & Development Co.
 Verde Queen Mining Co.

Quitootaa

Wayne Development Co.

PIMA (Continued).

Silver Bell

Arizona Belmont Mining Co.

Silver Bell

Copper Giant Mining Co.
 Imperial Copper Co.
 Roosevelt Mines & Reduction Co.
 Sascos Smelter
 Silver-Hill Consolidated Copper Co.
 Southern Arizona Sm. Co.

Tucson

Acme Mining & Reduction Co.
 Arizona Copper Mining Co.
 Big Vein Copper Co.
 Cababi Mining Co.
 Copper Range & Arizona Mining Co.
 Elephant Head Mining & Milling Co.
 Empire Zinc Co.
 Gould Copper Mining Co.
 Grand Central Mining Co.
 Kornkob Mining & Development Co.
 Lincoln Consolidated Mining Co.
 Mineral Hill Consolidated Copper Co.
 New State Copper Mining Co.
 Old Pueblo Mining & Milling Co.
 Pioneer Smelting Co.
 Pontotoc Mining Co.
 South San Xavier Copper Co.
 Swastika Copper & Silver Mining Co.
 Texas Copper Co.
 Tucson Consolidated Copper Co.
 Weldon Gold & Copper Co.

Twin Buttes

Chesterfield Copper Co.
 Esperanza Copper Co.
 Pennfield Mining Co.
 Twin Buttes Mining & Smelting Co.

PINAL

Casa Grande

Arizona Mercantile Trans. & Sm. Co.
 Brownell-Arizona Mining & Sm. Co.
 Keystone Development Co.
 Wessell Copper Mining & Milling Co.

Copper Basin

Calumet & Copper Creek Mining Co.

Florence

Alta Central Copper Co.
 Alta Mining & Smelting Co.
 Amalgamated Gold, Cop. & Sil. Co.
 Arizona Hancock Copper Co.
 Arizona Pacific Copper Co.
 Ensley Giant Mining & Dev. Co.
 Florence Copper Mining Co.
 La Coronado Development Co.
 Maverick Copper Co.
 Newbury Mining Co.
 Oklahoma Copper Co.
 Rosemere Mine
 Superstition Mountain Mining Co.

Kelvin

Eagle Mountain Copper Co.
 Gila Monster Copper Co.
 Golden Bell Mining Co.
 Kelvin-Sultana Copper Co.
 Ray-Arizona Copper Co.
 Sultana-Arizona Copper Co.
 Table Mountain Copper Co.

Mammoth

Mammoth Mine
 Michigan-Arizona Mining Co.

Oracle

Canada del Oro Mining & Dev. Co.
 Dalley Arizona Copper Co.
 Majestic Copper Co.

Price

Coronado Mine

Ray

Arizona Hercules Copper Co.
 Copper Butte Mines
 Douglas Copper Co.
 Gila Canon Copper Co.
 Ray Central Copper Mining Co.
 Ray Consolidated Copper Co.

PINAL (Continued).

Ray

Ray Eastern Copper Co.

Red Rock

Arimex Consolidated Copper Co.
 Buckeye & Calumet Arizona Mg. Co.
 El Tiro Copper Co.
 Morajeski Mines
 Owl Head Copper Co.
 Oxide Copper Co.
 Tortillita Copper Co.

Schultz

Mammoth Collins Mine

Superior

Belle Springs Group
 Brown Whitlow Group
 Daggs-Newman Synd.
 Fortuna Mining Co.
 Lake Superior & Ariz. Mg. & Sm. Co.
 Lincoln Issues Company
 Magma Copper Co.
 Oregon-Arizona Copper Co.
 Queen Copper Mining Co.
 Reymert Mine
 Silver King Mine
 Sin Rival Copper Co.
 Windsor Mining, Milling & Sm. Co.

Vekol

Silver Reef Mining & Smelting Co.
 Tube City Mining & Milling Co.
 United Arizona Copper Co., Ltd.
 Vekol Mining Co.

SANTA CRUZ

Amadoville

New State Mining & Reduction Co.
 Papago Chief Mine
 Pluto Mining Co.

Duquesne

Duquesne Mining & Reduction Co.
 Havalina Mining Co.

Harshaw

Bland Mine
 Chief Group
 Farrell Mine
 Tia Juana Mine

Mowry

Red Cone Mining Co.
 Red Mountain Copper Mining Co.

Nogales

Chenoweth Bros.
 Providencia Mining Co.
 Trenton Mining Co.

Oro Blanco

Arapahoe Copper Mining Co.
 Border Mines Co.
 Oro Mine
 Old Glory Mine

Patagonia

Arizona-Pacific Copper Co.
 Arizona-Pittsburg Mining & Sm. Co.
 Bradford Mine
 Bruner Copper Co.; R. E.
 Cons. Mines, Smelting & Trans. Co.
 Crescent Copper Co.
 Four Metals Mining Co.
 Happy Jack Mining & Reduction Co.
 Hardshell-Flux Mining & Dev. Co.
 Hosey Mine
 Ivanhoe Mining Co.
 Mansfield Mining & Smelting Co.
 Morning Glory Mine
 Mumme Mining Co.
 National Consolidated Mining Co.
 Patagonia Mines & Development Co.
 R. R. R. Copper Mine
 Ruby Copper Co.
 Southern Arizona Mining Co.
 Three R. Mines
 Trench Consolidated Mines Co.
 Viceroy Mining Co.
 Worlds Fair Mine

Tubac

Baboquivari Copper Co.

YAVAPAI

Bagdad

Arizona-Nevada Copper Co.
 Bagdad Copper Co.
 Niagara Copper Co.

Big Bug

Aladdin Mining Co.
 Argyle Mining Co., Ltd.
 Arizona Bonanza Mining Co.
 Fortune Mining Co.

Black Rock

Big Blue Mining Co.

Chaparral

Ohio Mines Co.

Cherry

Arizona Copper-Gold Mines Co.
 Cherry Creek Mines Co.

Constellation

Arizona Copper Belt Mining Co.
 Blue Ridge Mining Co.
 Fort Henry Mining Co.
 Fremont M. & M. Co.
 Hale M. & M. Co.
 Torrette Group

Copper Basin

Rainy Day Group

Dewey

Black Chief Copper Co.
 La Gracia Gold & Copper Co.

Goddards

May Copper Co.

Goldzona

Investment M. & M. Co.

Harrington

Big Seven Group
 Nelson Mining Co.
 Pacific Copper Mining Co.
 Trier Gold Co.
 Yavapai Cons. Gold-Silver-Cop. Co.

Hassayampa

Beemer Cons. Gold & Copper Co.
 Billy Boy Mines
 Block Mines Co.
 Little Johnnie Mine

Humboldt

Arizona Blue Bell Copper Co.
 Arizona Central Copper Co.
 Arizona Smelting Co.
 Baumann Mines Co.
 Consolidated Arizona Smelting Co.
 Humboldt Cons. Mines Co.
 Humboldt Ore Co.
 Humboldt Smelter
 Knight Copper Co.
 Lincoln Gold M. & M. Co.
 New England & Ariz. G. & C. M. Co.

Huron

Huron Gold Co.

Jerome

Arkansas & Arizona Copper Co.
 Black Hills Copper Co., Ltd.
 Boston & Jerome Copper Co.
 Butte & Verde Gold & Copper Co.
 Calumet & Jerome Copper Co.
 Cleopatra Copper Co.
 Cons. King Dev. & Columbia C. M. Co.
 Cons. United Verde A. & C. M. Corp.
 Cons. United Verde Jr. Mining Corp.
 Copper Chief Mining Co.
 Decatur Copper Mining Co.
 Equator M. & S. Co.
 Eureka Gold & Copper M. Co.
 Haynes Copper Co.
 Hull Copper Co.
 Illinois & Jerome Copper Co.
 Jerome Verde Copper Co.
 Louisiana & Arizona M. Co.
 Mescal Mining Co.
 Mingus Mountain Copper Co., Ltd.
 Pittsburg-Jerome Copper Co.
 Sycamore M., S. & Dev. Co.
 Two Republics Mining Co.
 United Verde Copper Co.

YAVAPAI (Continued).

Jerome

United Verde Extension M. Co.
Venture Hill M. Co.
Verde Apex Copper M. Co.
Verde Copper M. Co.
Verde Grande Copper Co.
Yaeger Canyon Copper Co.

Junction

Ford Mining Co.
Mineral Point M. Co.

Kirkland

Best Friend Group
Malapai Mining Co.
McMahon Group
Stein Copper Co.
Zonia Mine

Lynx Creek

Bonney Mining Co.

Maxton

Cash Mining Co.
Castle Copper Co.
Commercial Mining Co.

Mayer

Arizona Blue Bell C. Co.
Arizona Copper Queen M. Co.
Arizona Exploration Co.
Arizona Merger G. & C. M. Co.
Blue Bell Mine
Brooklyn-Arizona M. Co.
Butte & Arizona C. M. Co.
Cashier Copper M. Co.
Con. Copper Creek M. Co.
Copper Queen Gold M. Co.
Deer Track Copper Co.
Iron Queen M. & S. Co.
Logos Mines Co.
Lop Ear Mine
Lyons Copper Co.
May Mining Co.
Mayer Cons. Mining Co.
Mayer M. & M. Co.
New Issue Gold M. & M. Co.
Pocahontas Copper Queen M. Co.
Rosalie Copper Co.
Treadwell Mining Co.

McCabe

Ideal M. & M. Co.
Lelan Gold & Copper Co.
Lookout Copper Co.
Redman M., M. & S. Co.

Prescott

Aztec Mines Co.
Black Hills G. & C. M. Co.
Coronado G. & C. M. Co.
Crown Butte M. & S. Co.
Haney Copper Co.
Juanita M. & M. Co.
Madizelle Mining Co.
McKinley M. & Dev. Co.
Monroe Copper Mine
Mother Lode Copper Co.
Pan-American M. & S. Co.
Prudential Copper M. Co.
Thumb Butte M. & M. Co.
United Arizona Copper Co.
United G. & C. M. Co.
White Horse Mining Co.
Yavapai Metals M. & Red. Co.

Skull Valley

Logan Copper Co.
Skull Valley M. & M. Co.

Stoddard

Binghampton Copper Queen M. Co.
Copper Queen Mine
Stoddard Mines Co.

Tip Top

Harris Copper Co.
Kay Copper Co.

Turkey

Buckeye Copper & Gold M. Co.
Lloyd Cons. Copper Co.
Naco Cons. Copper Co.

YAVAPAI (Continued).

Wagoner

Big Butte Mining Co.

Walker

New Mexico Lead & Copper Co.

YUMA

Bouse

Bowyer Gold & Copper Co.
Daly Mines Co.
Ibex Plomosa M. Co.
Montana-Arizona Copper Co.
Mudersbach Mine
Pay Car Mines Co.
Record Mines Co.
Valensuella Copper Co.

Dome

Thumb Butte Mining Co.

Ehrenberg

Arizona Giant Copper Co.
Colonial Mining Co.

Parker

Arizona Empire C. Mines Co.
D. W. Mining Co.
Hon Mining Co.
Juniata G. & C. Co.
Quartz King M. Co.
Roberts-Allen Mavis Group
Ruby G. & C. Co.
St. Valentine G. & C. M. Co.
Tuscarora M. & M. Co.
Wardwell & Osborne C. Mines Co.

Planet

Bill Williams M. & Dev. Co.
Continental C. & G. M. Co.
Inland Copper Co.
New Planet Copper M. Co.

Plomosa

Desert Queen Gold Co.

Quartzite

Desert Queen Copper M. Co.
Success Mining Co.

Salome

Alvin Development Co.
Arizona Copper & Gold M. Co.
Tank Pass Cons. M. Co.

Swansea

Blue Bell M. & Red. Co.
Clara Cons. Gold & Copper M. Co.
Cons. Copper Mines Co.
Swansea Cons. G. & C. M. Co.
Swansea Smelter

Vicksburg

Arizona Success M. Co.
La Belle M. Co.
Shamrock Mining Co.

Wellton

Arizona Cons. Mines Co.
California-Arizona Copper Co.

Wenden

Arizota Mining Co.
Bullard Mine
California Dev. Co.
Corona Copper Co.
Cunningham Pass Copper M. Co.
Harcuvar Copper Co.
Joseph Wilkinsons Mines
Molina & Sanginetti M. Co.
Oro Cobre M. Co.
Red Bird Cons. M. & S. Co.
Victor & Belle Crown M. Co.
Wendendale Gold M. Co.

Yuma

Arizona Mining Co.

Arkansas

CLEBURNE

Heber

Heber Springs Copper M. Co.

California

ALPINE

Markleville

Curtz Consolidated Mines Co.
Morning Star Mine

- ALAMEDA
Oakland
 Montana Smelting Co.
- AMADOR
Ione
 Ione Coal & Iron Co.
Jackson
 Copper Hill Mine
- CALAVERAS
Campo Seco
 Campo Seco Copper Co.
 Campo Seco Mines
 Constitution Mine
 Ingomar Cons. Gold Mg. Co.
 Penn Mg. Co.
Copperopolis
 Calaveras Copper Co.
 Napoleon Mine
Gwin Mine
 Gwin Mine Development Co.
- COLUSA
Ladoga
 Ruby King Copper Co.
- CONTRA COSTA
Martinez
 Martinez Smelter
- CONTRA COSTA
Selby
 Selby Smelting & Lead Co.
- DEL NORTE
Crescent
 Cleopatra Group
 Low Divide Copper Mining Co.
Smith River
 Salt Lake-California Copper Co.
- EL DORADO
El Dorado
 Peyton Chemical Co.
Greenwood
 Sacramento Valley Copper Co.
 Shamrock Mine
 Tahoe Copper Mine
- FRESNO
Clovis
 Fresno Copper Co., Ltd.
- HUMBOLDT
Eureka
 Horse Mountain Copper Co.
 Humboldt Copper Co.
Fortuna
 Fortuna Copper Co.
Korbel
 Ruby Copper Co.
- INYO
Big Pine
 Loretta Mining Co.
Bishop
 California-Nevada Mg. & M. Co.
 Rochelle Mg. & M. Co.
Citrus
 Inyo County Cons. Copper Co.
Cocumongo Springs
 Copper Mountain Claims
Darwin
 Lake Superior Coso Dev. Co.
Greenwater
 Death Valley Copper Glance Mg. Co.
 Death Valley Copper M. & Sm. Co.
 Furnace Creek Copper Co.
Independence
 Reward Cons. Mine
Keeler
 Estelle Mg. Co.
 Four Metals Smelter & Mining Co.
 Inyo Copper Mines Corp.
 Inyo Copper Mines & Smelters Co.
Lee
 Lee Consolidated Mines Co.
Lone Pine
 Ubehebe Copper Mines & Sm. Co.
Skidoo
 Granite Contact Mines Co.
- INYO (Continued).
Tecopa
 Ore Gulch Mining Co.
- KERN
Havilah
 New World Mg. & Milling Co.
Woody
 Greenback Copper Co.
- LAKE
Middletown
 Copper Prince Mining Co.
- LASSEN
Doyle
 California-Utah G. & C. Mg. Co.
- MADERA
Daulton
 Buchanan Mine
 Ne Plus Ultra Mines
Madera
 Jesse Belle Mg., M. & Sm. Co.
Raymond
 Copper Mines Co. of California
 Green Mountain Copper Mines
 Pearce Mine
- MARIN
Bolinas
 Bolinas Copper Mining Co.
- MARIPOSA
Indian Gulch
 Copper Queen Mine
 Owl Copper Mg. Co.
Lewis
 Pocahontas Copper Mg. Co.
- MENDOCINO
Ukiah
 Redwood Copper Queen Mg. Co.
- MONO
Masonic
 Masonic Mtn. Gold Mining Co.
Oasis
 Original Blue Bird Copper Mg. Co.
- MONTEREY
Table Mtn.
 Native Copper Mining Co.
- NEVADA
French Corral
 South Yuba Mg. & Sm. Co.
Relief Hill
 Fairview Mining Co.
Spenceville
 California Gold & Copper Co.
 Spence Mineral Co.
Wolf
 Pine Hill Cons. Mining Co.
- PLACER
Auburn
 Nevada Mining Co.
Lincoln
 Valley View Mining Co.
Newcastle
 Holmes Lime Co.
Van Trent
 Dairy Farm Mining Co.
- PLUMAS
Clio
 Antelope Mg. & M. Co.
Genesee
 Eagle Mine
 Five Bears Mining Co.
 Genesee Valley Copper Co.
 Sierra Range Copper Co.
 Sunrise Mining Co.
 Walker Mining Co.
Indian Falls
 Indian Falls Dev. Co.
Lights Canyon
 Engels Copper Mining Co.
Portola
 Copper Queen Mine
Quincy
 Blue Bell Mining Co.
 Mountain Meadow Copper Co.

PLUMAS (Continued).

Taylorville
Eagle Copper Co.

RIVERSIDE

Blythe
Continental Mines Development Co.
Iron Mountain Copper Co.

Salton

Blew Bur Copper Co.

SAN BERNARDINO

Bagdad

Bagdad Mg. & M. Co.

Barnwell

Giant Ledge Gold & Copper Co.

G. H. Hamstadt

Barstow

Camp Vera Group

Calzona

Calzona Mines Co.

Martin Mine

Republic Smelting Corp.

Steece Copper Co.

Cima

Copper Gulch Mining Co.

Garvanza Mg. & M. Co.

Standard Mines Co.

Dale

Brooklyn Mining Co.

Greenwater Copper Mines & Sm. Co.

United Greenwater Copper Co.

Forest Home

Forest Home Mining Co.

Ivanpah

Cocopah Copper Co.

Ivanpah Mammoth G. & C. Mg. Co.

Kelso

Lucille Gold & Copper Mining Co.

Leastalk

Leastock Gold & Copper Mining Co.

Needles

Headlight Gold & Copper Mg. Co.

National Copper Co.

Needles Mining & Sm. Co.

Whipple Mountain G. & C. Co.

Purdy

Sagamore Mining Co.

Stagg

Pacific Mines Corporation

Vidal

Tuscarora Mg. & M. Co.

Vontrigger

Bonanza Mg. & Dev. Co.

California Gold & Copper Co.

Whipple Mtn.

American Eagle G. & C. Co.

D. & W. Mining Co.

Eagle American Group.

SAN DIEGO

Encinitas

Danes Lea Mining Co.

SAN MATEO

Barzilla

Isabella Copper Mg. Co.

SHASTA

Afterthought

Baker Copper Mine

Copper City

Arps Group

Copley

Baker Cons. Copper Mg. Co.

Bully Hill Cave Mine

Golden Eagle Gold Mg. Co.

Coram

Balaklala Central Mg. & Sm. Co.

Balaklala Cons. Copper Co.

Balaklala Copper Co.

Coram Smelter

First National Copper Co.

Onn Copper Mining Co.

Ingot

Afterthought Copper Co.

Kennett

Golinsky Mining Co.

SHASTA (Continued).

Kennett

Mammoth Copper Mg. Co. of Maine

Shasta County G. & C. Mg. Co.

Stauffer Chemical Co.

Trinity Copper Co.

Vulcan Copper Mining Co.

Keswick

Iron Mountain Mine

Mountain Copper Co., Ltd.

Pittsburg & Mt. Shasta G. M. & M. Co.

Kimberly

Standard Mining Co.

Stowell Mine

Redding

Copper Mountain Cons. Mg. Co.

Delta Consolidated Mining Co.

Friday-Lowden Copper Co.

Greenhorn Mine

Shasta Copper Co.

Shasta Copper Expl. Co.

Standard Development Co.

Shasta

Mountain Monarch Gold Mining Co.

Winthrop

Bully Hill Copper Mining & Sm. Co.

Cave Creek Mining Co.

Little Bully Hill Mg. & Sm. Co.

Shasta Belmont Mining Co.

Shasta May Blossom Cop. Co. Cons.

SIERRA

Loyalton

Antelope Gold & Copper Co.

SISKIYOU

Happy Camp

Dakin Mine

Gray Eagle Mine

Hutton

Blue Ledge Mine

Copper King Mining Co.

Joe Creek Copper Co.

Siskiyou Copper Mg. Co.

Weed

Yellow Butte Copper Co.

TEHAMA

Lowry

Basler Mining & Dev. Co.

Red Bluff

Calif. & Mass. Copper Mines Co.

Chicago Copper Refining Co.

Massachusetts Cons. Copper Co.

TRINITY

Carrville

Trinity Gold Mg. & Red. Co.

Quinby

Bear Tooth G. & C. Mines Co.

Quinby Mining Co.

Hoaglin

Island Mountain Copper Mine

TUOLUMNE

Tuolumne

Rose Springs Mining Co.

Colorado.

BOULDER

Cardinal

Swarthmore Consolidated Mining Co.

Eldora

Cons. Copper Mg., M. & Sm. Co.

Fourth of July Mining & Milling Co.

Spencer Mountain Tunnel Co.

Jamestown

Copper Blush Mining Co.

Lyons

Bell Mine

Sunset

Arapahoe Gold & Copper Mining Co.

Copper Rock Gold Mining & M. Co.

Ward

Copper Mountain Mining & M. Co.

Copper Ranch Gold Mining & M. Co.

BOULDER (Continued).

Ward

Giles Gold Mining & Milling Co.
Utica Mining & Milling Co.

CHAFFEE

Garfield

Taylor Mountain Mining Co.

Granite

Climax Mining Co.
Granite Tunnel Co.

St. Elmo

Gold Queen Mining Co.

Salida

Antero Mining Co.
Colchester Gold & Copper M. & M. Co.
Giant-Eclipse Consolidated Mg. Co.
Griffith Consolidated Mine
Mountain Mining Co.
Ohio & Colorado Sm. & Ref. Co.
Peerless Mining & Milling Co.
Salida Copper Co.
Sedalia Copper Co.
Shawmut Consolidated Copper Co.

Turret

Hecla-Granite Mining Co.
Redoubtable Gold & Cop. M. & M. Co.
Stratton Gold & Copper Co.

Winfield

Tasmania Copper Mg. & M. Co.

CLEAR CREEK

Alice

Coleman Free Gold Mining Co.

Empire

Marshall & Russell Gold M., M. & Tunnel Co.
Silver Mountain M. & M. Co.
Tennessee Mg. & M. Co.

Georgetown

Capital Mining & Tunnel Co.
Centennial Mine
Santiago Cons. Mg., M. & T. Co.
Waldorf Consolidated Mining Co.

Idaho Springs

Alice G. Mills Corporation
Alma Gold Mining Co.
Argo Mining, Drainage, T. & T. Co.
Argo Mining & Tunnel Co.
Argo Red. & Ore Purchasing Co.
Big Five Tunnel, Ore Red. & T. Co.
Dubuque Mining & Tunnel Co.
Federal Mines Corporation
Gem Consolidated Mines Co.
Idaho Bride Mining & Milling Co.
Idaho Mg., Red. & Trans. Co.
Lucania Tunnel & Mines Co.
Memphis & Idaho Sp. G. M. & M. Co.
North American Sm. & Mines Co.
Pennsylvania Mining Co.
Pennsylvania Mining, P. & R. Co.
Pozo Gilpin Mining Co.
Saratoga Mining Co.
Shafter Mining Co.
Specie Payment Mine
Stanley Mines Co.

Yankee

Continental Mines, Power & Red. Co.

CONEJOS

Ortiz

Oro Quay Gold Mg. & Red. Co.

CUSTER

Fairview

Marion Mines & Mills Co.

Rosita

Jocomo Mine

DENVER

Denver

Globe Smelting & Refining Co.
Modern Smelting & Refining Co.
National Copper Tempering Co.

DOLORES

Rico

Rico Argentine Mining Co.
Rico Mining Co., The

DOLORES (Continued).

Rico

Rico Wellington Mining Co.
Rio Dolores Mining Co.

EAGLE

Red Cliff

Alligator & Tiger Leasing Co.

FREMONT

Canyon City

Copper Boy Mining Co.

Copperfield

Copperfield Cons. Copper Co.

Hillside

Colorado Mining Land & Invest. Co.

Parkdale

Murray-Isabel Mines Co.

GILPIN

Apex

Evergreen Gold & Copper Mines Co.

Blackhawk

Fifty Gold Mines Corporation
Phoenix-Burroughs Mine
Rocky Mountain Conc. & M. Co.

Central City

Alps Mining Co.
Aurora Gold & Copper Mining Co.
Aztec Mines Co.
Bezant Gold Mining Co.
Calhoun Cons. Mines Co.
Cashier Gold Mining & Red. Co.
Druid Gold Mining Co.
Freedom Mining Co.
Frontenac Cons. Mines, Ltd.
Gilpado Mining Co.
Hearne Gold & Copper Co.
Hulbert Mine
Pittsburg Mine
Topeka Cons. Mining Co.
U. P. R. Milling & Mines Co.

Gregory

Gilpin Orion Gold Mining Co.
Great Bonanza Gold Mining Co.

Rollinsville

A. K. R. Gold Mg. & M. Co.

Russell Gulch

Hampton Cons. Mines Co.
Jefferson-Calhoun Mining Co.
Old Town M., M. & Trans. Co.

GRAND

Parshall

Mollie Groves Mg. & M. Co.

Radium

Price Copper Mining Co.
Radium Copper Mining Co.

GUNNISON

Crested Butte

Bonanza Dev. Co.
Sulphide Copper Co.

Crystal

Bear Mountain Tun. & Mg. Co.
North Pole Mining Co.

Pitkin

Brant Gold & Copper Co.
Brant Independent Mining Co.
Emma H. Mine
Queen Bee Mine

Tin Cup

Blistered Horn Mine
Brunswick Mining & Milling Co.

White Pine

Silver Spar Mining Co.
United Mining & Holding Co.

HINSDALE

Capitol City

Hanna Mining & Milling Co.

Lake City

Colorado & Conn. Gold Mg. Co.
Donnelly Mining & Reduction Co.
Fanny Fern Mining Co.
Frank Hough Mining Co.
Hinsdale Tunnel & Reduction Co.
Lake City Mining & Smelter Co.
Pelican Mining & Milling Corp.

- JACKSON**
Pearl
 Knapp Mining Co.
JEFFERSON
Cliff
 Copper King Cons. Mining Co.
Golden
 Golden Smelter
LAKE
Leadville
 Bertonelli Leasing Co.
 Garbutt Leasing Co.
 Iron Silver Mining Co.
 Luema Mining Co.
 New Monarch Mining Co.
 Onyx Group
 Republic Smelting Co.
 Rex Gold Mines & Investment Co.
 Third Venture Mining Co.
 Yak Mining, M. & T. Co.
Twin Lakes
 Manhattan Mining & Power Co.
LA PLATA
Durango
 Durango Smelter
La Plata
 Boren Gulch Mining Co.
 Copper Hill Mining Co.
Needletown
 Aztec Gold & Copper Mining Co.
LARIMER
Pearl
 Coldwater Copper Mining Co.
 Kalamazoo Copper Mining Co.
Walden
 Village Belle Gold & Copper Co.
MESA
Grand Junction
 Western Slope Copper Mg. & Sm. Co
MONTEZUMA
Cortez
 Ute Gold & Copper Co.
Mancos
 Doyle Consolidated Mines Co.
MONTROSE
Paradox
 La Sal Copper-Silver Mining Co.
 Paradox Mining & Milling Co.
OURAY
Ironton
 Barstow Mine
 Brown Mountain Smelting Co.
Ouray
 United States Mining Co.
Red Mountain
 Gold Lion Mines Co.
 Mono-Baltic Mining & Sm. Co.
 Red Mountain Railroad Mg. & Sm. Co.
 San Antonio Mining Co.
 Southern Exploration & Mining Co.
PARK
Alma
 Colorado Gold Mining & Sm. Co.
 Moose Mine
 Success Mining Co.
Hayman
 Apex Copper Co.
Lake George
 Great Western Mine
 Lake George Development Co.
 Three B Mining Co.
FUEBLO
Pueblo
 Pueblo Smelter
ROUTT
Columbine
 Boston-Sierra Madre Mine Ind. Co.
Hahns Peak
 Farwell Mountain Copper Co.
 Hahn's Peak*Gold Mining & M. Co.
Steamboat Springs
 Copper Ridge Mg. & M. Co.
 Steamboat Mg. & M. Co.
SAGUACHE
Bonanza
 Rawley Mining Co.
Creston
 Santa Isabel Mg. & M. Co.
Vulcan
 Good Hope Mg. & Red. Co.
SAN JUAN
Animas Forks
 Earle Mine
 Frisco Mines & Tunnel Co.
Eureka
 Astor Mining Co.
 California Mountain Mining Co.
 Eureka Exploration Co.
 Martin Mining & Power Co.
 Sunnyside Mines
Gladstone
 Gold King Leasing Co.
Howardsville
 Gold Tunnel & Railway Co.
 Green Mountain Mg. & M. Co.
 Hamlet Mg. & M. Co.
Ironton
 Genessee Vanderbilt Mine
Mill Gulch
 Precious Metals Corporation
Silverton
 Aspen Mine Co.
 Congress Gold & Copper Co.
 Detroit & Colorado Mining Co.
 Gold Mining Co.
 Henrietta M. & M. Co.
 Kittimac Mines Co.
 Mammoth Tunnel & Mining Co.
 New Gold King Mines
 Old Hundred Mining Co.
 Ross Mg. & M. Co.
 St. Paul Mining & Red. Co.
 Silver Lake Mines
 Stony Pass Mining Co.
 W. B. Lowe Mining Co.
SAN MIGUEL
Ophir
 New Dominion Gold Mining Co.
Telluride
 Black Bear Mining Co.
 Four Metals Mining Co.
 Japan-Flora Mines & Tunnel Co.
 Lewis Mines
 Utah Gold Mountain Mining Co.
SUMMIT
Breckenridge
 American Mine
 O'Reilly Gold Mining Co.
Dillon
 Lenawee Mg., M., T. & Trans. Co.
SUMMIT
Frisco
 Excelsior Mg., M. & Electric Co.
 King Solomon Tunnel & Dev. Co.
 Mary Verna Mg. & M. Co.
 Square Deal Mg. & Dev. Co.
Wapiti
 Wapiti Mining Co.
TELLER
Cripple Creek
 Beacon Cons. Mines Co.
 Requa-Savage Gold & S. Mg. & M. Co.
 Savage Gold & Copper Mining Co.

Connecticut.

- NEW HAVEN**
Seymour
 New Haven Copper Co.
Waterbury
 Detroit & Lake Superior Copper Co.

Florida.

- MARION**
 Georgia & Tennessee Copper Co.

Georgia.

CARROLL
Villa Rica
 Chestatee Mine

FANNIN
Pierceville
 Baker Cons. Copper M. Co.

HARALSON
Temple
 Georgia & Tennessee Copper Co.

MURRAY
Wells
 Alyce Mineral Co.

WILKES
Metasville
 Magruder Mine
 Lincoln G. & C. M. Co.
 Seminole Mine

Idaho.

ADAMS
Cuprum
 Badger Group of Copper Mines
Homestead
 Fidelity Copper Co.
 Arkansasaw Mine
Landore
 Blue Jacket Copper Co., Ltd.
 Decorah Mine
 Hancock C. Mines Co.
 Red Ledge Mine
 Seven Devils Copper Co.

BANNOCK
Pocatello
 Fort Hall Mg. & M. Co., Ltd.
 Intermountain Gold & Cop. Mg. Co.
 Pocatello Gold & Copper Mining Co.

BEAR LAKE
Montpelier
 Bonanza Mine
 Bonanza Mining Co.
 Copper Mountain Mining Co.

Paris
 Paris Boulder Mining Co.

BINGHAM
Gray
 Caribou Gold & Copper Co.

BLAINE
Bellevue
 Idaho Consolidated Mines Co., Ltd.
Clyde
 Copper & Uranium Mining Co.

Hailey
 Croesus Gold & Copper Mining Co.

Ketchum
 Boston-Idaho Mining Co.
 Golden Glow Mining Co.

BONNER
Bonner's Ferry
 Idaho-Montana Amalgamated Mg. Co.
Coolin
 Fern Cliff Mining Co.
 Idaho Copper Co.
 Priest Lake Copper Mg. & M. Co.
 Priest Lake Mining & Smelting Co.

Port Hill
 Idaho Continental Mine

Priest River
 Kootenai County Mining Co.
 Kootenai Mining & Milling Co., No. 2
 Northwest Coeur d'Alene Italic Cop.
 Mg. & Dev. Co.

Sandpoint
 Dixie Queen Copper Mg. Co., Ltd.
 Ponderay Smelter

CASSIA
Albion
 Melcher Mining & Milling Co.

CLEARWATER
Pierce
 Oxford Copper Mining Co.

CUSTER

Bay Horse
 Ramshorn Mine

Clayton
 Clayton Mining & Smelting Co.
 Idaho Mining & Smelting Co.

Ivers
 Loon Creek Mg. & Investment Co.
 Lost Packer Extension Mining Co.
 Lost Packer Mining Co.
 Lost Packer Mining & Smelting Co.

Mackay
 Alta Copper Mining Co.
 Champion Mining Co.
 Empire Copper Co.
 Horseshoe Copper Co.
 Mackay Idaho Mining Co.
 White Knob Copper & Dev. Co., Ltd.

FREMONT
Dubois
 Weimer Copper Co.

IDAHO
Big Creek
 Red Metals Mine
Clearwater
 Clearwater Gold & Copper Mg. Co.
Edwardsburg
 Moore Copper Mine
Lucile
 Blue Jacket Mining Co.
 Northwestern Mining Co.

Pardee
 Alta-Idaho Gold & Copper Mg. Co.

Pollock
 Hartwig Mining Co.

Robbins
 Concord Mining Co.

St. Joe
 Peacock Copper Mining Co.

KOOTENAI
Lane
 Idaho-Eagle Mining Co.
 Silica Gold & Copper Mining Co.

LATAH
Harvard
 Garfield Mining & Milling Co.
 Mizpah Copper Mining Co., Ltd.

Potlatch
 Latah Copper Mining Co., Ltd.

Troy
 Inland Copper Co.
 O. K. Olsen Copper Mine
 Troy Mining & Milling Co.

LEMHI
Baker
 Duluth-Lemhi Mining Co.
 Virginia Mining Co.

Nicholia
 Lost River Copper Co.

Salmon
 Blackbird Cop. & Gold Mg. Co., Ltd.
 Butte & Idaho Gold & Cop. Mg. Co.
 Carmen Creek Mining Co.
 Copper Queen Mining & Sm. Co.
 Idaho Copper Mining Co.
 New Columbia Mining Co.
 Tendoy Mine

Shoup
 Copper King Mining Co.

Sunfield
 Copper Queen Mine

LEWIS
Forest
 Deer Creek M. & M. Co.

NEZ PERCE
Greer
 Pittsburg-Idaho M. & M. Co.

Illo
 Copper King M. & M. Co.

Lewiston
 Aai M. & M. Co.

Lookout
 Snow Cliff Copper M. Co., Ltd.

OWYHEE

Silver City

South Mountain Mines

SHOSHONE (*Coeur d' Alene*)*Burke*

Comstock Copper M. Co., Ltd.

Excelsior M. Co.

Great Western M. Co.

Imperial M. Co.

Lynn & Idaho M. Co.

Military M. & M. Co., Ltd.

Rob Roy M. Co.

Temple M. Co., Ltd.

Enaville

Enaville Smelter

Gem

Roberta M. & M. Co.

Copper Prince Cons. M. & M. Co.

Florence M. Co.

Kellogg

Lombardy M. & M. Co.

Teddy M. & M. Co., Ltd.

Yankee Boy M. Co.

Kingston

Horst-Powell Copper M. Co.

Hypotheek M. & M. Co.

Mullan

Advance M. Co.

Aeolian Copper Cons. M. Co., Ltd.

Bullion M. Co., Ltd.

Carbonate Center M. Co.

Carney Copper Co.

Champion Copper M. Co.

Comet Gold & Copper M. Co., Ltd.

Copper Crown M. Co.

Copper King M. & Smelting Co.

Copper Plate M. Co., Ltd.

Copper Queen M. & M. Co., Ltd.

East Snowstorm M. Co.

Eclipse M. Co.

Fox Copper M. & M. Co.

Ibex M. Co.

Idaho Copper M. Co., Ltd.

Independent Copper M. & M. Co.

Leslie Copper M. Co.

Lewis & Clark M. Co.

Lucky Calumet Copper M. Co., Ltd.

Lucky Swede Gold & C. M. Co., Ltd.

Missoula Copper M. Co.

Monitor Cons. Copper M. Co.

National Copper M. Co.

Nonpareil Copper M. Co.

Pandora Copper M. Co.

Park Copper & Gold M. Co., Ltd.

Reindeer C. & Gold M. & M. Co., Ltd.

Reindeer Queen M. Co.

Silver Cliff Gold & C. M. Co., Ltd.

Silver Mountain M. Co., Ltd.

Snowshoe M. Co.

Snowstorm Apex M. Co.

Snowstorm Extension Copper M. Co.

Snowstorm M. Co.

Springfield Gold & C. M. Co., Ltd.

Transcontinental S. & C. M. Co., Ltd.

Tucker M. & M. Co., Ltd.

Murray

Belmont-Banner M. Co.

Blaine & Emmett M. Co., Ltd.

Ironclad Mine

New Chicago M. Co., Ltd.

North Fork Gold & Copper M. Co.

Warwhoop M. Co.

Wonderful M. Co., Ltd.

Osburn

Belmont M. Co., Ltd.

Coeur d' Alene Cons. M. Co.

Coeur d' Alene Nellie M. Co.

Flagstaff M. Co., Ltd.

Four Ledge M. Co.

Gray Copper M. Co.

Lead King M. Co.

Moon Creek M. Co.

Nellie Mine

SHOSHONE (Continued).

Osburn

Rhode Island M. Co., Ltd.

Tam O'Shanter M. Co., Ltd.

Verde M. Co., Ltd.

Wisconsin M. Co.

Wallace

Best Chance M. Co., Ltd.

Custer Cons. M. Co.

Gold Leaf Cons. M. Co.

Interstate-Callahan Cons. M. & M. Co.

Interstate Silver Lead M. Co.

Jumbo Mg. Co.

Log Cabin M. & M. Co.

Lucky Friday M. Co.

Rainbow M. & M. Co., Ltd.

Silver Rock M. Co.

Spokane Tunnel Mine

Vienna International Mine

Caledonia Gold & Copper M. Co.

Hamburg-American Cop. M. & M. Co.

Little North Fork C. M. & M. Co., Ltd.

Paymaster Mine

WASHINGTON

Council

Peacock Mine

Cuprum

Inca M. & M. Co.

Mineral

Ladd Metals Co.

Seven Devils

American M. Co., Ltd.

Weiser

Hunt M. & M. Co.

Keystone M. Co.

Illinois.

COOK

Blue Island

Chicago Copper Refining Co.

Indiana.

LAKE

East Chicago

International S. & R. Co.

Kansas.

MONTGOMERY

Coffeyville

Ozark Smelting & Mining Co.

Maine.

OXFORD

Bryant Pond

Mount Glines G. & S. Mg. Co.

Maryland.

BALTIMORE

Canton

Baltimore Copper Sm. & Rolling Co.

Mt. Washington

Bare Hill Mine

FREDERICK

New London

Dolly Hyde Mine

Linganore Copper Co.

United M., M. & Copper Sm. Co.

Massachusetts.

FRANKLIN

Charlemont

New England Mining Co.

Michigan.

HOUGHTON

Baltic

Baltic M. Co.

Calumet

Calumet & Hecla M. Co.

Centennial Copper M. Co.

Iroquois Copper Co.

Kearsarge Mine

La Salle Copper Co.

Laurium M. Co.

Osceola Cons. M. Co.

HOUGHTON (Continued).

Calumet

St. Louis Copper Co.
 South Kearsarge Mine
 Tamarack M. Co.
 Torch Lake M. Co.
 Wolverine Copper M. Co.

Houghton

Boston & Lake Superior M. L. Co.
 Copper Range Railroad Co.
 Dakota Heights Co.
 Franklin Junior Mine
 Franklin Mining Co.
 Hancock Cons. M. Co.
 Houghton Copper Co.
 Hulbert M. Co.
 Hussey-Howe M. Co.
 Isle Royal Copper Co.
 Lake M., S. & R. Co.
 Lake Superior S. Co.
 Mayflower M. Co.
 Michigan S. Co.
 Montezuma M. Co.
 Naumkeag Copper Co.
 New Arcadian Copper Co.
 New Baltic Copper Co.
 Old Colony Copper Co.
 Oneco Copper M. Co.
 Pacific Copper Co.
 Quincy M. Co.
 Rhode Island Copper Co.
 St. Mary's Mineral Land Co.
 Section Twelve Exploration Co.
 Shelden & Columbian Copper Co.
 South Lake M. Co.
 South Range M. Co.
 South Side M. Co.
 Superior Copper Co.
 Tamarack-Osceola Copper Mfg. Co.
 Union Copper Land & M. Co.
 Whealkate M. Co.

Painesdale

Atlantic M. Co.
 Champion Copper Co.
 Copper Range Co.
 Copper Range Consolidated Co.
 Globe M. Co.

Trimountain

Trimountain M. Co.

Winona

Contact Copper Co.
 Elm River Copper Co.
 King Philip Copper Co.
 Winona Copper Co.
 Wyandot Copper Co.

KEWEENAW

Allouez

Allouez M. Co.
 Douglass Copper Co.

Copper Falls

Arnold M. Co.
 Ashbed M. Co.
 Clark Mine
 Humboldt Copper Co.
 Meadow M. Co.
 Natick Copper Co.

Delaware

Delaware Mine
 Manitou M. Co.
 Native Copper Co.
 Senter-Dupree Dev. Co.
 Washington Copper M. Co.

Eagle River

Agate Harbor Mine
 Frontenac Copper Co.

Isle Royale

Cove Land & M. Co.
 Island Copper Co.
 Minong Copper Co.

Kearsarge

Ahmeek M. Co.

Mandan

Keweenaw Copper Co.

KEWEENAW (Continued).

Mandan

Medora Mine

Mohawk

Gratiot M. Co.
 Lake Superior Dev. Co.
 Mohawk M. Co.
 Seneca M. Co.

Ojibway

Ojibway M. Co.

Phoenix

Cliff M. Co.
 Dana Copper Co.
 New York Cons. M. Co.
 Phoenix Cons. Copper Co.

MARQUETTE

Marquette

Keweenaw Association, Ltd.

ONTONAGON

Adventure Cons. Copper Co.
 Algoma M. Co.
 Bohemia M. Co.
 Carp Lake Mine
 Cascade Mine
 Cherokee Copper Co.
 Copper Crown M. Co. of Michigan
 Evergreen Bluff M. Co.
 Indiana M. Co.
 Lake Copper Co.
 Lake Shore M. Co.
 Lake Superior Copper Co.
 Mass. Cons. M. Co.
 Michigan Copper M. Co.
 Mulock Mine
 National M. Co.
 Nonesuch Mine
 North Lake M. Co.
 Onondaga Copper Co.
 Ridge Copper Co.
 Toltec Mine
 Tremont & Devon M. Co., Ltd.
 Union Mine
 Victoria Copper M. Co.
 West Minnesota M. Co.
 Wetterhorn Land Co.
 White Pine Copper Co.
 Wilmot M. Co.

Minnesota

PINE

Hinckley

Big Eddy M. Co.
 Great Northern Copper Co.
 Keweenaw Western Dev. Association
Pine

J. Bennett Smith M. Co.

Missouri

FRANKLIN

Sullivan

Missouri Copper Mountain M. Co.

MADISON

Frederickstown

North American Mine

ST. FRANCIS

Flat River

Federal Lead Co.

ST. GENEVIEVE

St. Genevieve

Cornwall Copper M. & S. Co.

Montana

BEAVERHEAD

Apex

Indian Queen M. & S. Co.

Argenta

Butte-Argenta Copper Co.
 Jack Rabbit Mining Co.

Bannack

Bannack Cons. Mining Co.

Briston

Montana Oreway M. Co.

BEAVERHEAD (Continued).

- Butte*
 - Hecla (Cons.) Mine
 - Dillon*
 - Argenta-Dillon M. Co.
 - Highland Copper Co., Ltd.
 - Elkhorn*
 - Boston & Montana Dev. Co.
 - Penobscot Mining Co.
 - Fox*
 - Ajax Mine
 - Polaris*
 - Silver Fissure M. Co.
- BROADWATER
- Argo*
 - Eclipse-Argo Mining Co.
 - Radersburg*
 - Cactus Copper Co.
 - Calumet & Montana M. Co.
 - Keating Gold M. Co.
 - Lycoming Co.
 - Ohio Keating Gold M. Co.
 - Summit Gold M. Co.
 - Townsend*
 - Broadwater County M. Co.

CASCADE

- Nehart*
 - Copper Wealth M. Co.

CHOUTEAU

- Carter*
 - King & Queen M. Co.

DAWSON

- Java*
 - Great Northern Copper Co.
 - Oakesdale Copper Co.

DEER LODGE

- Anaconda*
 - Deerlodge Cons. Mines, Ltd.
 - Washoe Smelter

Cable

- Butte-Cable C. & G. M. Co.
- Cable Cons. Mining Co.

FLATHEAD

- Coram*
 - Felix Basin Copper Mines
 - Flathead Dev. Co.
 - Glacier Peak Copper M. Co.
- Essex*
 - Lippincott Mine
 - South Fork & Kalispell C. Co.
- Whitefish*
 - Comet M. & M. Co.
 - Leupter Mining Co.

GALLATIN

- Belgrade*
 - Garfield Mining Co.
- Bozeman*
 - International Mining Co.
- Three Forks*
 - Three Forks Copper M. Co.

GRANITE

- Maxville*
 - Royal Basin Mining Co.
- Phillipsburg*
 - Barnes Copper Co.
 - Howard Copper Co.
 - Royal Mountain Mining Co.
 - Swastika Mine
- Princeton*
 - Mount Royal M. & Red. Co.
 - Northern Bell Mining Co.
- Sunday*
 - Albion Copper M. Co.

JEFFERSON

- Alhambra*
 - Carbonate Chief Mine
 - Montana-States Mining Cor'n
 - War Eagle G. & C. M. Co.
- Amazon*
 - Baltimore Copper Mining Co.
 - Robert Emmet Copper Co.

JEFFERSON (Continued).

Basin

- Ada Copper Mining Co.
- Allport Mining Co.
- Basin Reduction Co.
- Betty Alden Mining Co.
- Bullion Mine
- Butte & Basin Copper M. Co.
- Butte & Philadelphia Mine
- Copper Block Mine
- Copper King Mine
- Crystal Group
- Eva May Mine
- Leadville M. & S. Co.
- McCaffrey Mining & Smelting Co.

Boulder

- Butte & Boulder M. Co.
- Montana Cons. Copper Co.

Clancey

- Black Jack Copper M. Co.
- Helena-Butte Mining Co.
- King Solomon Mining Co.
- Liverpool Mining Co.
- Montana Copper & Silver M. Co.
- Yellowstone Mine

Corbin

- Alta-Corbin Copper Co.
- Bertha Mine
- Boston & Alta Copper Co.
- Boston & Corbin C. & Sil. M. Co.
- Butte Cons. Copper M. Co.
- Butte & Corbin Cons. Copper M. Co.
- Corbin Copper Co.
- Corbin-Copper King M. Co.
- Corbin Metal Mining Co.
- Corbin-Pennsylvania M. Co.
- Corbin-Valparaiso Copper M. Co.
- Minneapolis-Corbin Copper Co.
- Montana Corbin Copper Co.
- New Boston Mining Co.
- New York & Montana Copper M. Co.
- Valparaiso Mine

Elkhorn

- Elkhorn Mining Co.
- Golden Curry (Jacquemin Mine)
- Golden Curry Cons. M. Co.

Homestake

- Butte-Homestake Copper M. Co.
- Sunset National Mining Co.

Jefferson

- Prickly Pear Mining Co.

Lowland

- Ruby Mine

Renova

- Daisy Bell Gold & Copper Dev. Co.

Wickes

- Abe Mining Co.
- Blue Bird Corbin Gold, Sil. & Cop. M. Co.
- Calumet-Corbin Mining Co.
- Corbin-Wickes Copper M. Co.
- Dailey Copper M. & S. Co.
- Uncle Sam Mine

Whitehall

- Ironside Mine

LEWIS & CLARK

Helena

- Argo Mine
- American Mining Co., Ltd.
- Arkansas Copper Co.
- Contact Cons. Copper Co.
- Copper-Silver Montana M. Co.
- General Mines Co.
- Montana Copper-Silver Co.
- Northwestern Metals Co.
- Sacajewea Gold & Copper M. Co.
- United Smelting & Ref. Co.

Marysville

- Cuprite Copper M. Co.
- Pittsburgh-New York C. M. Co.

Wolf Creek

- Wolf Creek Copper M. Co.

LINCOLN

Libby

International Copper M. Co.

Troy

Victoria Mine

MADISON

Jefferson Isl.

Montana-Illinois Copper M. Co.

Norris

Calamont Copper Co.

Parrot

Copper King Mine

Pony

Leviathan Gold Mining Co.

Mountain Meadow Group

Sheridan

Cornelia Mining Co.

Lentz Gold-Copper M. & Red. Co.

Toledo Mining & Power Co.

Stone Creek

International Copper & Gold Co.

Montana Copper & Gold M. Co.

Twin Bridges

Bear Gulch Mining Co.

MEAGHER

Copperopolis

Home Copper Mining Co.

Moonlight Mine

Delphine

Clara Barton Mine

Flint

Gila River Copper Mines Co.

Martinsdale

Copper State Mining Co.

Spring Gulch

Durant M. & S. Co.

MISSOULA

Borax

Amazon-Dixie Mining Co.

Clinton

Aladdin Mining Co.

Cape Nome Copper M. Co.

Jack Pot Mines

Shaughnessy Mine

Speculator Mining Co.

Triangle M. & Dev. Co.

De Borgia

De Borgia Copper M. Co.

Rock Island Mine

Rough Rider M. & M. Co.

True Fissure Mining Co.

Hamilton

Hamilton-Montana Gold M. Co.

Haugan

East Coeur d'Alene Mine

Iron Mtn.

Amador Cons. M. & Dev. Co.

Amador Copper & Gold M. & M. Co.

Amador Smelting Co.

Keystone

Idaho & Spring Gulch M. & M. Co.

Iron Mask Mining Co.

Swastika Copper M. Co.

Lothrop

Coppersmith M. & M. Co.

Quartz

Copper Hill Mg. Co.

St. Regis

Copper Ball Mine

Gold Crown Mining Co.

Hidden Treasure Group

St. Regis Copper M. Co.

St. Regis Copper M. & M. Co.

Saltese

Agnes Mining Co.

Alpena Copper Mining Co.

Bald Mountain M. & S. Co.

B., A. & P. Group

Ben Hur Mining Co.

Big Elk Mining Co.

Black Traveler Copper M. Co.

Boston-Colby Copper M. Co.

Bryan Mining Co.

MISSOULA (Continued).

Saltese

Buffalo Mining Co.

Coeur d'Alene Pacific Mines Co.

Copper Age & Edison M. Co.

Copper Chief Mining Co.

Hugo Gold & Copper M. Co.

Iron Spar Copper M. Co.

Last Chance Copper M. Co.

Leroy Gold & Copper M. Co.

New York & Saltese Copper M. Co.

Richmond M. & Red. Co.

St. Joe Gold-Cop. M. & M. Co.

St. Lawrence Copper M. Co.

Saltese Cons. Copper M. & M. Co.

Saltese M. & M. Co.

Switchback Claim

Stark

Josephine Copper Mining Co.

Superior

Darby M. & M. Co., Ltd.

Wisconsin Montana M. Co.

Taft

Dennemora G. & Cop. M. Co., Ltd.

Inland Mining Co.

Taft Mine

PARK

Cooke

Cooke M. & Red. Co.

Copper King M. Co.

Goose Lake Copper Co.

Mont. Scotch Bonnet C. & G. M. Co.

POWELL

Blackfoot

B. & B. Mine

Ophir Gold & Copper M. Co.

Blossburg

Blue Bell Mine

Coloma

Quantock M. & M. Co.

Deer Lodge

Independence Gold & Copper Co.

Elliston

Arnold Mine

Butte & Elliston G. & C. M. Co.

Elliston Copper Mining Co.

Flagstaff Mine

Ladysmith Copper Mining Co.

Monarch Mine

Montana-Clinton Copper Co.

Twin City M. & M. Co.

RAVALLI

Florence

Bonanza Mountain Copper Co.

Victor

Curlew Mine

Ore Finder Mining Co.

SANDERS

Belknap

Royal Copper Mining Co., Ltd.

Camas

Camas Copper M. & M. Co.

Camp Revias

Revias Creek M. & Power Co.

Dixon

Revias Mining Co.

Perma

Duston Copper Group

Thompson

Arlington Mining Co.

Copper Mountain M. & Dev. Co.

Thompson Falls Copper M. & M. Co.

SILVER BOW

Butte

Alex. Scott Mine

Alice Gold & Silver M. Co.

Alice Mine

Alliance Copper Co.

Amalgamated Copper Co.

Anaconda Copper Mining Co.

Atlantic Mines Co.

Bamar Copper Co.

Big Butte Mining Co.

SILVER BOW (Continued).

Butte

Black Rock Mine
 Blue Vein Copper M. Co.
 Bullwhacker Copper Co.
 Butte Alex. Scott Copper Co.
 Butte & Bacorn Mining Co.
 Butte-Ballaklava Copper Co.
 Butte Central Copper Co.
 Butte Central Copper M. Co.
 Butte Central Copper M. & S. Co.
 Butte Coalition Mg. Co.
 Butte Cons. Copper Co.
 Butte Copper Co.
 Butte Copper King M. Co.
 Butte Copper Montana
 Butte-Curtis & Majors Cop. M. Co.
 Butte-Duluth Mining Co.
 Butte & Great Falls Mining Co.
 Butte Hill Copper M. Co.
 Butte Lode Extension M. Co.
 Butte & London Copper Dev. Co.
 Butte Main Range Copper M. Co.
 Butte-Milwaukee Copper Co.
 Butte Mine Exploration Co.
 Butte-Minnesota Mining Co.
 Butte Monitor Tunnel Mining Co.
 Butte & New York Copper Co.
 Butte Northern Mining Co.
 Butte & Red Eagle Copper Co.
 Butte & Superior Copper Co., Ltd.
 Butte & Veronica Copper M. Co.
 Butte & Zenith City Mining Co.
 Colusa-Leonard Extension Cop. Co.
 Colusa-Parrot M. & S. Co.
 Cons. Central Butte Copper Co.
 Davis-Daly Copper Co.
 Eagle Mining Co.
 East Butte Copper M. Co.
 East Butte Ext. Copper M. Co.
 Elm Orlu Mining Co.
 Emma Mine
 Farrell Copper Co.
 Flatiron Mine
 Girard Copper Co.
 Ida Montana Mining Co.
 La France Copper Co.
 Laurium-Montana Mining Co.
 Leonard Mine
 Lexington Mine
 Magna Charter Mine
 Montana Ore Purchasing Co.
 North Butte Extension Dev. Co.
 North Butte Mining Co.
 Parrot Silver & Copper Co.
 Pilot Butte Mining Co.
 Pittsburg & Montana Copper Co.
 Pittsburg-New York Copper M. Co.
 Pittsmont Copper Co.
 Pittsmont Smelter
 Rainbow Lode Development Co.
 Raven Copper Co.
 Red Metal Mining Co.
 Reins Copper Co.
 Reliance Mine
 Smokehouse Mining Co.
 South Butte Mining Co.
 Speculator Mine
 Ticon Mine
 Tuolumne Copper Mg. Co.
 Washoe Copper Co.

Divide

Cayuga Development Co.

Nevada

CHURCHILL

Boyer

Boyer Cons. M. Co.

Dixie

Copper Queen Group

Fairview

Minnesota-Nevada Investment Co.

CLARK

Bunkerville

Nevada Copper, Plat. & Nickel Co.

Good Springs

Alice Copper & Zinc M. Co.

Azurite M. Co.

Ninety-Nine Copper Co.

Las Vegas

Colorado R. Cop. & Gold M. Co.

Findlay Copper Chief M. Co.

St. Thomas

Tramp Miner M. Co.

Searchlight

Duplex Mine

DOUGLAS

Buckskin

Kennedy Cons. Gold M. & M. Co.

Standard Copper Co.

Union Copper Co.

Gardnersville

Red Canyon M. Co.

ELKO

Battle Mountain

Nevada-Calumet Copper Co.

Bullion

Nevada-Bullion Mines Co.

Nevada Bunker Hill M. Co.

Contact

Apex M. & M. Co.

Brooklyn M. Co.

China Mountain Copper Co.

Copper Shield M. Co.

Delano Mine

Elk Mountain M. Co.

Ivy Wilson Mine

Lewis Group

Nevada Contact Copper Co.

Nevada Copper M., M. & Power Co.

Rock Springs Exploration Co.

Salmon River M. Co.

Salt Lake Group

Seattle Contact M. Co.

Winnemucca Group

Zetta Blanchard Mine

Currie

Kinsley Development Co.

Nevada Delker Copper M. Co.

Dolly Varden

Nevada-Butte Copper M. Co.

Ferber

Chance Copper M. Co.

Gold Circle

Utah-Nevada Development Co.

Mizpah

Copper King Gold & Copper M. Co.

Mizpah Cons. Copper & Gold M. Co.

Sprucemont

Spruce Mountain Copper Co.

Wells

Black Forest M. & S. Co.

Ohio Lead M. & S. Co.

ESMERALDA

Cocomunga

Ulida Cons. Copper Co.

Goldfield

Arizona Success M. Co.

Atlanta Mines Co.

Blue Bull Mine

C. O. D. Consolidated

Copper-Gold Mines Co.

Goldfield Cons. Mines Co., The

Goldfield Merger Mines Co.

Goldfield Mines Operating Co.

Gowganda Copper Co.

Jumbo Extension M. Co.

New York-Nevada Gold-Cop. M. Co.

Reorganized Blue Bull M. Co.

Yellow Tiger M. Co.

Hawthorne

Royal Cons. Copper Co.

Hornsilver

Gold Mountain Mines

ESMERALDA (Continued).

Lida

Goldfield-Anaconda Copper Co.
Indian Springs M. Co.
Syncline Gold-Silver-Copper M. Co.

EUREKA

Beowawe

Nevada-Phoenix M. Co.

Cedar

Nevada Central Copper Co.

Eureka

Ruby Copper Co.
Ruby Hill Tunnel & M. Co.

Palisade

Zenoli Silver-Copper Co.

HUMBOLDT

Cholona Copper Co.

Golconda

Adelaide Star Mines, Ltd.
Copper Acres M. Co.
Glasgow & West. Expn. Co., Ltd.
Golconda-Nevada Copper Co.
Silverfields M. Co., Ltd.

Humboldt House

Antelope Spring M. Co.

Imlay

Imlay M. Co.
Nevada Mines Co.

Lovelock

Mines Dev. Co. of Nevada
Nevada Development Co.
Nevada United M. Co.

Rye Patch

Rye Patch Cons. Mines Co.
Rye Patch M. & Leasing Co.

Winnemucca

Bonanza M. Co.
56 (Fifty-six) Copper Mine
Humboldt Copper Co.

LANDER

Austin

Maricopa Mines Co.

Battle Mountain

Copper Basin M. & M. Co.
Jersey Valley Mines Co.

Tenabo

Tenabo M. & S. Co.

LINCOLN

Goodsprings

Bingham Nevada M. Co.
Columbia Mine

Hiko

Hiko Nevada M. Co.

Pioche

Bristol Avon M. Co.
Bristol Cons. Mines & Smelting Co.
Bristol Copper M. Co.
Bristol Valley M. Co.
Cons. Nevada Utah Cor'n
Day Bristol M. Co.
E. & F. M. Co.
Ely Valley M. & M. Co.
Hillside Copper Co.
Home Run Copper Co.
Kismet M. Co.
Lincoln-Nevada M. & M. Co.
Manhattan Copper M. & M. Co.
Mendha-Nevada M. Co.
Nevada-Utah Mines & Smelt. Cor'n

St. Thomas

Finance M. Co.
Grand Gulch M. Co.

Sandy

Green Monster Mine

Searchlight

Lenape Gold & Copper M. Co.
Phila.-Searchlight G. & C. M. Co.
Searchlight Copper-Gold M. Co.

LYON

Ludwig

K. & R. Property
Nevada Douglas Copper Co.

LYON (Continued).

Ludwig

North Douglas Copper Co.
Yerington Bullion Copper Co.

Morning Star

Albany Copper Co.
Denny Dulin Gold & Silver M. Co.
Nevada Bonanza Copper Co.

Wabuska

Nevada Calumet Copper M. Co.
Wabuska Copper Mines Co.

Yerington

Black Copper Co.
Black Diamond Copper M. Co.
Black Rock Mine
Blue Jay Mine
Bluestone M. & S. Co.
Burlington-Nevada Copper Co.
Butte & Yerington Copper Co.
Copper Belt M. & Dev. Co.
East Yerington Copper Co.
Empire-Nevada Copper M. & S. Co.
Honest Endeavor M. Co.
Kaufman & Randall Mine
Ludwig Mine
Mason Valley Extension M. Co.
Mason Valley Mines Co.
McConnell Mines Co.
Montana Yerington Co.
Native Copper M. Co.
Nevada Copper Co.
Nevada-Denver Copper Co.
Nevada Queen Copper Co.
New Yerington Copper Co.
Northern Light Copper Co.
Oakland Copper Bell Mine
Reno Yerington Copper Co.
Rossland Group
Utah-Yerington M. Co.
Western Nevada Copper Co.
Yerington Central Copper Co.
Yerington Cons. Copper Co.
Yerington Cop. Merger M. & S. Co.
Yerington Copper Mountain M. Co.
Yerington Ironsides Copper Co.
Yerington Malachite Copper Co.
Yerington Mines & Exploration Co.

MINERAL

Acme

Nevada Ore Copper Co.

Hawthorne

Excelsior Mountain Copper Co.
Nevada Cons. Mines & Selling Co.

Luning

Anderson Group
Del Monte Cons. M. & Ref. Co.
Luning-Idaho M. Co.
Nevada Copper Hills M. Co.
Nevada Copper Queen Mine
Nevada Standard Copper Co.
Pilot Range Mine
Shipper Copper M. Co.
Wagner Azurite C. Co.

Mina

Blue Light Copper Co.
Blue Light Mine
Dunlap Copper Mine
Nevada Champion Copper Co.
Nevada Copper Co.
Nevada Pacific Mines Co.
Taft & Dunlap Mine

Qualey

Qualey M. Co.

Rawhide

Queen Regent Merger Mines Co.

Schurz

Yerington Mountain Copper Co.

NYE

Berlin

Goldfield Blue Bell M. Co.

Caliente

Oak Springs Copper Co.

NYE (Continued).

- Funeral Range*
- Betune Mine
- Hot Creek*
- Hotcreek Syndicate Trust
- Manhattan*
- Toquima Copper Co.
- Rhyolite*
- Lodi G. & C. Co.
- Sunset M. & Dev. Co.
- Tonopah*
- Tonopah Liberty M. Co.
- Tybo*
- Nevada Smelting & Mines Co.

ORMSBY

- Carson City*
- Brunswick Cons. M. Co.
- Eagle Valley M. & M. Co.
- Nevada Delaware M. & M. Co.
- United M. Co.

Jacks Valley

- Bigot Copper Mines

WASHOE

- Reno*
- Granite Hill Copper Mine
- Red Metals Co.
- Twin Metals M. Co.

WHITE PINE

- Aurum*
- Cambria Copper Co.
- Cherry Creek*
- Ely Star M. Co.
- Nevada British M. Co., Ltd.
- Vulcan M. S. & Ref. Co.

Ely

- Boston-Ely M. Co.
- Butte & Ely Copper Co.
- Centennial Dev. Co.
- Chainman Cons. Copper Co.
- Consolidated Copper Mines Co.
- Coppermines Co.
- Douglas-Ely Mines Co.
- Ely Amalgamated Copper Co.
- Ely Arch Copper Co.
- Ely Bell M. Co.
- Ely-Calumet Copper Co.
- Ely Cons. Copper Co.
- Ely Copper Co.
- Ely Giroux Copper Co.
- Ely Hidden Treasure Cons. M. Co.
- Ely Majestic Copper Co.
- Ely Mizpah Copper Co.
- Ely National Copper Co.
- Ely-Nevada Copper Co.
- Ely Revenue Copper Co.
- Ely Silver Lead Copper Co.
- Ely Verdi Copper Co.
- Ely-Witch Copper Co.
- Federal-Ely Copper Co.
- Giroux Cons. Mines Co.
- Hidden Treasure Cons. Copper Co.
- Lee Cons. Mines Co.
- McDonald-Ely Copper Co.
- McGill Smelter
- Nest Egg Gold & Copper M. Co.
- Nevada Cons. Copper Co.
- Nevada Ely Copper Co.
- New Ely Central Copper Co.
- Pittsburg-Ely Copper Co.
- Princess Copper Co.
- Smokey Dev. Co.
- Steptoe Valley S. & M. Co.
- United Ely Copper Co.
- Willard-Ely Copper Co.

Hamilton

- Alta-Zoanni M. Co.
- Grand Prize Group
- Hamilton Power M. & T. Co.

New Hampshire

COOS

Milan

- Milan Mining & Milling Co.

New Jersey

ESSEX

- Irrington*
- Irrington Smelting & Refining Co.

HUDSON

- Bayonne*
- Orford Nickel Copper Refinery

HUNTERDON

- Flemington*
- Copper Run Copper Co.

MIDDLESEX

- Chrome*
- U. S. Metals Refining Co.

Perth Amboy

- Int. Smelting & Refining Co.
- Perth Amboy Smelter
- Raritan Copper Works

NEWARK

- Newark Bay*
- Balbach Smelting & Refining Co.

SOMERSET

- Sommerville*
- Alpha Copper Co.

UNION

- Elizabeth*
- N. J. Metal Refining Works, Ltd.

WARREN

- Belvidere*
- Pahaquarry Copper Co.

New Mexico

BERNALILLO

- Albuquerque*
- Reliance Gold Mining Co.

COLFAX

- Cimarron*
- Cimarron Mountain Mining Co.

Elizabethtown

- Black Copper Co.
- G. & C. Deep Tunnel M. & Mfg. Co.

DONA ANA

- Organ*
- Aztec Copper Co.
- Bennett-Stephenson M. & Mfg. Co.
- Big Three Mines
- Copper Bullion Mine
- Donna Dora Mining Co.
- Memphis Mining Co.
- Organ Mountain Mining Co.
- Torpedo Mine

GRANT

- Fierro*
- Bessemer Copper Mines Co.
- Bessemer Iron Association
- Copper Queen Con. Mining Co.
- Emma Mine

Hachita

- Anderson-Apache Copper Co.
- Hachita Copper Development Co.
- Sunset Copper Co.

Hanover

- Hanover Copper Co.
- Hermosa Copper Co.
- Leo XIII Mining Co.
- United States Copper Co.

Hurley

- Chino Copper Company

Jackson

- The Golden Link Co.

Leopold

- Burro Mountain Copper Co.

Lordsburg

- Atwood Copper Co.
- Battleship Mining & Milling Co.
- Bonney Mining Co.
- Century Copper & Gold Mining Co.
- C. O. D. Leasing Co.
- Eighty Five Mining Co.
- Miser's Chest Mine
- Monte Rico Mining & Milling Co.
- Mulberry Mining Co.
- North American Copper Co.
- Octo Mining Co.

GRANT (Continued).

Lordsburg

Robert Lee Mine
Sutton Consolidated Mining Co.

Santa Rita

Columbia Copper Co.
Copper George Developing Co.
Empire Copper Co.
Great Eastern Group
Santa Maria Group
Savage Gold & Copper Mining Co.

Silver City

Cleveland Group of Mines & Mill
Forest Queen Copper Co.
St. Louis Gold Gulch Mining Co.
Savanna Copper Co.
Tulloch Gold & Copper Co.

Steeple Rock

American Exploration & Mining Co.
Shamrock Mining & Milling Co.

Steins

Copper Queen & Copper King Group
Johnny Bull Mine
King of Queen Copper Co.
National Gold & Silver Mining Co.

Tyrone

Azure Mining Co.
Chemung Copper Co.
Mangas Development Co.
National Copper Co.
Tyrone Copper Co.
Woodward Mining Co.

LINCOLN

Carriozo

Economic Mining & Milling Co.
Iowa & New Mexico Mining Co.
La Salle Copper Mining & Mfg. Co.

Corona

Corona Queen Mining Co.
Red Cloud Mine

Jicarilla

Fleming-Fox Mining & Smelting Co.
Revenue Mfg. Co.

Oscuro

Chicago Copper Mining Co.

LUNA

Deming

Bessemer Gold & Copper Mining Co.
Castle Dome Metals Co.
Copper City Mining Co.

MORA

Lucero

Constitution Con. Copper Mines
Republic Mines Co.

OTERO

Alamogordo

De Mier Copper Co.

Bent

Tularosa Copper Co.

Jarilla

Alabama Mine
Altamont Milling Co.
American Copper & Mining Co.
April Fool Mine
Bent Mine
By Chance Copper Co.
Cacti Group
Copper Hill Mines Co.
Delusion Mine
Eureka Mines Co., Consolidated
Excelsior Mining & Dev. Co.
First National Mining Co.
Garnet Mine
Iron King Mine
Jarilla Consolidated Copper Co.
Jarilla Copper Syndicate
Lucky Group
Otero Copper Co.

Tularosa

Hembrillo Copper Mining Co.

RIO ARRIBA

Embudo

Champion Copper Co.

RIO ARRIBA (Continued).

Tusas

Admiral Gold & Copper Mining Co.
Bromide Copper Mining Co.
Sixteen to One Mine
Tusas Peak Gold & Copper M. Co.

SAN MIGUEL

Cowles

Pecos Copper Co.

El Porvenir

Romero Mining Co.

Las Vegas

Blake Mining, Milling & Invest. Co.

Tecolote

Las Vegas Copper Co.

SANTA FE

Cerrillos

Rocky Mountain Mines Co.

San Pedro

San Lazarus Mines Co.
Santa Fe Gold & Copper Mining Co.

SIERRA

Chloride

Black Range Tunnel & Mining Co.

Cutter

Wellington Copper Mining Co.

Engle

Hickok Mine

Fairview

Comanche Consolidated Copper Co.

Hermosa

El Cliff Mining Co.

Hillsboro

Sigma Construction & Dev. Co.

Whitewater Canyon

National Copper Co.

SOCORRO

Alma

Independent Mine
Oaks Co., The
Overland Group
Putnam Engineering Co., The C. H.
Silver Peak Mine

Cooney

Mogollon Gold & Copper Co.
Queen Mining Co.

Estey

Dividend Mining & Milling Co.
United Mining & Holding Co.

Graham

Helen Mining Co.

Kelly

Cavern Gold Mining Co.
Kelly Mine

Tri-Bullion Smelting & Dev. Co.

Magdalena

Calumet-New Mexico Mining Co.
Hop Canon Mining & Smelting Co.
Ozark Smelting & Mining Co.

Mogollon

Silver Tip Group

Socorro

Abbey Mining Co.
New State Smelting Co.

TAOS

Arroyo Seco

San Cristobal Copper Co.

Red River

Edison Mining & Milling Co.

Taos

Shoshone Mine

Tres Piedras

Keystone Bromide Mining Co.

Twining

American Consolidated Mines Co.
Fraser Mountain Copper Co.

UNION

Clayton

Fort Pitt Copper Co.
Rohr-Geddes Mining & Dev. Co.

New York**ERIE***Buffalo*

Buffalo Smelting Works

NEW YORK*New York*

American Finance & Securities Co.

Douglas, Lacey & Co. (defunct)

Lewisohn Exploration & M. Co.

Mining Issues Co.

United Copper Securities Co.

United Metals Selling Co.

Western Development Co.

PUTNAM*Carmel*

Grant Mine

QUEENS*Laurel Hill*

Nichols Copper Co.

RICHMOND*Tottenville*

Tottenville Copper Co.

North Carolina**ASHE***Hopkins*

Copper Knob Mine

CHEROKEE

Axley Copper Co.

GUILFORD*Greensboro*

Century Development Co.

Twin-Edwards Copper Mine Co.

High Point

Deep River Gold Mining Co.

JACKSON*Cullowhee*

Carolina Copper Co.

Cullowhee M. & Red'n Co.

PERSON*Virginia Copper Belt*

Blue Wing M. Co.

Roxboro

Duke Mine

Person Cons. Copper & G. M. Co.

Pontiac M. Co.

RANDOLPH*Ashboro*

Ashboro Copper M. Co.

ROWAN*Gold Hill*

Gold Hill Cons. Co.

Salisbury Copper Co.

Union Copper Mine

Union Copper Mines Co.

SWAIN*Medlin*

North Carolina M. Co.

Oklahoma

Baker Milling, Smelting & Ref. Co.

Oregon**BAKER***Baker*

Indiana M. Co.

Oregon-Idaho Investment Co.

Homestead

Homestead Copper Mines Co.

Iron Dyke Copper Co.

Medical Springs

Hoosier Boy Copper Co.

Sumpter

Blue Mountain M. Co.

Northwest S. & Ref. Co.

Sumpter Smelter

CURRY*Ilaha*

Cobre Gold M. Co.

DOUGLAS*Roseburg*

Coast Range Copper Co.

GRANT*Austin*

Vincent Creek G. & C. Co.

GRANT (Continued).*Prairie*

Comer Mines Company

Equity C. & G. M. Co.

Susanville

Northwestern G. & C. Co.

JOSEPHINE*Galice*

Alameda Cons. Mines Co.

Cleopatra Group

Grant's Pass

Copper Mountain M. Co.

Oak Cons. M. & M. Co.

Kerby

Chetko Copper Co.

Spence & Co.

Vanguard Gold-Copper Co.

Merlin

Copper Eagle M. Co.

Picket Creek Dev. Co.

Selma

United Copper-Gold Mines Co.

Silver Creek

Old Glory Mine

Takilma

Takilma Smelting Co.

Waldo Sm. & Ref. Co.

LANE*Bohemia*

Vesuvius Mines Co.

Cottage Grove

Grizzly Mine

MARION*Elkhorn*

Freeland Cons. M. Co.

Gates

Black Eagle M. & M. Co.

Idanha

Electric M. & S. Co.

UNION*North Powder*

Leaclede Cons. G. & C. M. Co.

WALLOWA*Imnaha*

Eureka M., S. & Power Co.

Lostine

Contact M. Co.

Pennsylvania**ADAMS***Fairfield*

National Copper M. & Dev. Co.

ALLEGHENY*Pittsburg*

Arizona-Idaho Cop. Extraction Co.

FRANKLIN*Charmian*

Bingham Mine

Eagle Metallic Copper Co.

Haycock Mine

Hayes Mine

Headlight Mine

United M., M. & Copper S. Co.

Virgin Copper Co.

Philippines

Copper King Mine

Lepanto Mining Co., Inc

Porto Rico.

Abundancia Mine

South Dakota**CUSTER***Custer*

Black Hills & Duluth Copper M. Co.

LAWRENCE*Deadwood*

Custer Peak M. Co.

Imperial Copper Co.

Jungle Mine

PENNINGTON*Rochford*

Black Hills Copper Co.

PENNINGTON (Continued).

Sheridan

Continental Copper M. & S. Co.
Dakota Calumet Co.
Dakota Continental Copper Co.
Maloney-Blue Lead Cop. M. & S. Co.

Tennessee**POLK***Copperhill*

Tennessee Copper Co.

Ducktown

Axley Copper Co.

Isabella

Ducktown Sulphur, C. & I Co., Ltd.

Texas**CULBERTSON***Van Horn*

Hazel M. Co.
Pecos M. Co.
Texas Turquoise M. Co.

EL PASO*El Paso*

Cons. Kansas City S. & Ref. Co.
Harper Mines
Sierra Blanca
Black Kettle Copper Co.
Little Lightning Copper Co.

Utah**BEAVER***Beaver*

Beaver-Butte Copper Co.
Granite Copper Co.

Frisco

Bon Soldat Mining Co.
Cupric Mines Co.
Frisco Con. Mining Co.
Horn Silver Mining Co.
Iowa-Utah Mining & Milling Co.
King David Mining Co.
Michigan Copper & Gold M. Co.
Western Mining & Leasing Co.

Milford

Beaver Consolidated Mining Co.
Beaver Copper Co.
Beaver-Harrison Mining Co.
Beaver Tri-Metallic Mining Co.
Copper Mountain Mining Co.
Copper Ranch Mining Co.
Galena Mining Co.
Grand Dominion Copper Co.
King of the Hills Mine
Leonora Mining & Milling Co.
Majestic Copper M. & Smelting Co.
Majestic Mines Co.
O. K. Extension M. & Red. Co.
Orphan Boy Mining Co.
Peacock Copper Consolidated Co.
Progressive Mining Co.
Red Warrior Mining Co.
St. Mary Mining Co.
Utah-United Copper Co.
Volunteer Mining Co.
Wasatch King Mining Co.

Moscow

Utah M., Mlg. & Transportation Co.

Newhouse

Blackbird Cop. & Gold M. Co., Ltd.
Cactus Mine
Commonwealth Mines Co.
Erie Mining Co.
Hendrikson Mine
Imperial Mine
Indian Queen Con. Mining Co.
South Utah Mines & Smelters

Smyths

Nevada Copper Co.

Star District

Blue Acre Copper Co.

BOX ELDER*Brown*

Copper Bell Mining Co.

BOX ELDER (Continued).*Grouse Creek*

Nonpareil Cons. Mng. & Mlg. Co.
Hot Springs
Eldorado Gold Mining & Mlg. Co.

Lucin

Mineral Mountain Mining Co.
Salt Lake Copper Co.

Promontory

Lakeside Copper Co.
Promontory Mining Co.

Sierra Madre

Santa Maria G. & C. Mg. & Red. Co.

Silver Island

Western Pacific Mining Co.

Strevell

Ginza Copper Co.

Tremonton

Copperfield Mining Co.

CACHE*Logan*

Copper Zone Mining Co.

Paradise

Royal Gold & Copper Mining Co.

DAVIS*Farmington*

Buckland Mining & Dev. Co.
Southworth Con. Mng. & Mlg. Co.

GRAND*Basin*

Boston & Utah Mining Co.

Castleton

Finley Mines
Rio Dolores Copper Co.

La Sal

Green Mountain Gold & Cop. M. Co.

IRON*Cedar City*

Homestake Mine

Modena

Iowa Copper Mining Co.

JUAB*Callao*

Alice Consolidated Mining Co.
Clifton Copper Belt Mining Co.
Four Metals Mining Co.
Seminole Copper Co.
Western Pacific Copper Co.
Carbonate
Mineral Flat Extn. Mng. & Mlg. Co.

Eureka

American Mines Syndicate
American Star Mining Co.
Antelope Mining Co.
Apex Mining Co.
Baltimore Consolidated Mining Co.
Bill Taft Mining Co.
Bullion Beck & Champion Mng. Co.
Centennial-Eureka Mining Co.
Chief Consolidated Mining Co.
Cleveland Mining Co.
Consolidated Copper Mining Co.
Copper Jack Mining Co.
Dragon Consolidated Mining Co.
Eagle & Blue Bell Mining Co.
East Tintic El Ray Mining Co.
Eureka Hill Mining Co.
Gemini Mining Co.
Godiva Mining Co.
Godiva-Sioux Mountain Mng. Co.
Grand Eastern Mining Co.
Grutli Mining Co.
Humbug Mining Co.
Iron Hat Mining Co.
Iron King Mining Co.
Kenyon Mining Co.
King William Mining Co.
Knight Investment Co.
Lily Mining Co.
McKinley Mining Co.
Plutus Mining Co.
Raymond-Illinois Mining Co.

JUAB (Continued).

Eureka

Tintic Combination Mining Co.
Tintic Delmar Mining Co.
Tintic Mayflower Mining Co.
Tintic Standard Mining Co.
Tintic Volcanic Mining Co.
Uncle Sam Consolidated Mining Co.
Victor Consolidated Mining Co.
Victoria Con. Mining Co.
White Star Mining Co.
Wicklów Mining Co.
Zuma Mining & Milling Co.

Knightsville

Richmond & Anaconda Con. M. Co.
Tintic Central Mining & Mlg. Co.

Mammoth

Black Jack Consolidated Mng. Co.
Boston & Tintic Mining Co.
Carisa Gold & Cop. Mng. Co. of Me.
Emerald Mining Co.
Iron Blossom Con. Mining Co.
Lower Mammoth Mining Co.
Mammoth Mining Co.
Mammoth No. 2 Mng. & Mlg. Co.
Tintic Silver Crown Mining Co.
Utah Con. Mining & Milling Co.

Robinson

Gold Chain Mining Co.
Grand Central Mining Co.
Gray Rock Mining Co.
Middle Swansea Mining Co.
Opex Consolidated Mines Co.
Opohongo Mining Co.

Silver City

Southern Swansea Mining Co.
Tintic Smelting Co.
United Tintic Mines Co.

KANE

Pahreah

Pahreah Consolidated Copper Co.

PIUTE

Kimberly

Copper Butte Mining Co.

Marysville

Beaver Mines Co.
Shamrock Mining Co.
Utah Gold Mountain Mining Co.

SALT LAKE

Alta

Albion Mining Co.
Alta Coalition Copper Co.
Alta Consolidated Mining Co.
Alta-Peruvian Mining & Mlg. Co.
Big Cottonwood Trans. & Tunnel Co.
Cardiff Mining & Milling Co.
City Rocks Mining Co.
Columbia Extension Mining Co.
Columbus Consolidated Mining Co.
Columbus Extension Mining Co.
East Columbus Mining Co.
Ely Bell Mining Co.
Emma Copper Co.
Flagstaff Copper Mining Co.
Free Coinage Mng. & Mlg. Co.
Grizzly Mining Co.
Great Copper King M. Co.
Independence Cop. & Gold Mng. Co.
International Consolidated Mng. Co.
Last Chance Mining Co.
Michigan-Utah Mining Co.
Rainbow Mining Co.
Rexall Silver & Copper Mining Co.
South Hecla Mining Co.
Wasatch Mines Co.

Big Cottonwood

Alta Tunnel & Transportation Co.
American Copper Co.
Glenwood Mining Co.

Bingham Canyon

Barney Canyon Mining Co.
Barstow Mining Co.
Bingham Amalgamated Copper Co.

SALT LAKE (Continued).

Bingham Canyon

Bingham-Bay State Copper Co.
Bingham Butte Consolidated M. Co.
Bingham Butte Copper Co.
Bingham Central Mining Co.
Bingham Central-Standard Cop. Co.
Bingham Copper Co.
Bingham Mary Copper Co.
Bingham Mines Co.
Bingham-New Haven C. & G. M. Co.
Bingham & Orleans Mining Co.
Bingham Standard Copper Co.
Congor Gold & Copper Mining Co.
Copper Hill Mining Co.
Fortuna Mining Co.
Highland Boy G. & C. M. Co.
International Mng. & Ind. Ass'n.
Keystone Extension Mining Co.
Lenox Mining Co.
Markham Gulch Mng. & Mlg. Co.
Mineral Lands Co.
Montana-Bingham Con. Mng. Co.
Mount Aetna Gold & Copper M. Co.
Nevada Exploration & Mng. Co.
New Bingham Consolidated Mng. Co.
New England Gold & Copper M. Co.
New Utah Bingham Mining Co.
Niagara Mining & Smelting Co.
North Bingham Con. Mng. Co.
North Utah Mng. Co. of Bingham
Ohio Copper Co.
Oxford Consolidated Mining Co.
Rob Roy Mining Co.
Samson Mining Co.
Shawmut Consolidated Copper Co.
Starless Mine
Tiewaukee Leasing Co.
Tintic Co.
Tintic Mining & Development Co.
Tom Moore Mine
Uintah Mining, Mlg. & Dev. Co.
United States Mining Co.
Utah-Apex Mining Co.
Utah Consolidated Mining Co.
Utah Copper Co.
Utah Lead & Copper Co.
Utah Metal Mining Co.
Ute Copper Co.
Winnimuck Mine
Yampa Mine
Yampa Smelting Co.
Yosemite Mines Co.

Brighton

American Consolidated Copper Co.
American Mining Co.
Big Cottonwood Con. Mng. Co.
Big Cottonwood Copper & G. M. Co.
Big Mitt Mining Co.
Copper Bank Mining Co.
Queen Bess Mining Co.
Thor Mining Co.
Woodlawn Copper Mining Co.

Draper

Great Copper King Mining Co.

Garfield

Garfield Smelting Co.

Hughes Canyon

St. Patrick Mining & Milling Co.

Lark

Dalton & Lark G., S. & L. M. & M.
Ohio Copper Co.
Ohio Copper Mining Co.

Midvale

United States Smelting Co.

Salt Lake City

Copper Reserve Mining & Red. Co.
Hanauer Smelting Works
King Copper Mining Co.
Midway Copper Mining Co.
Moscow Extension Mining Co.

Sandy

Utah Ore Sampling Co.

SALT LAKE (Continued).

West Jordan

West Jordan Smelter

SAN JUAN

Big Indian Copper Co.

SUMMIT

Park City

American Exploration Co.
 American Flag Mining Co.
 Conkling Mining Co.
 Daly Judge Mining Co.
 Daly West Mining Co.
 Great Western Gold & Copper Co.
 Iowa Copper Mining Co.
 J. I. C. Mining Co.
 Little Bell Con. Mining Co.
 New York Bonanza Mining Co.
 Roosevelt Mining Co.
 Scott Hill Mining Co.
 Silver Bell Mining Co.
 Thompson Quincy Con. Mng. Co.
 Utah Ore Sampling Co.
 Wabash Mining Co.

TOOELE

American Copper Mng. & Mlg. Co.

Clifton

Roy M. & M. Co.

Clover

Dugway Copper Mng. & Smelting Co.

Deep Creek

Deep Creek Consolidated Mining Co.
 Hudsoner Mining Co.

Erekson

Oasis Mining & Development Co.

Ibapah

Brewer Gold & Copper Mining Co.
 Copper Bell Mining & Milling Co.
 First Chance Mining & Milling Co.
 Garrison-Monster Mining Co.
 Ocean Mining Co.
 Red Copper Queen Mng. & Mlg. Co.
 Richards-Clifton Mining Co.
 Utah-Reliance Mining Co.
 Western Utah Copper Co.

Lincoln

Bingham Copper Boy Mining Co.
 Great Divide Mines Co.
 Western Mining & Milling Co.

Lofgreen

Utah Nevada Development Co.

Ophir

Dry Canyon Mines Co.
 Montana Consolidated Mining Co.
 Ophir Hill Consolidated Mining Co.
 Ophir King Gold Mining Co.
 Ophir Queen Mg. Co.
 Ophir-Utah Mining Co.
 Zella Mining Co.

Pine Canyon

Bingham Copper Tunnel Co.

Rush Valley

Eureka Ophir Mine

Stockton

Duluth & Utah Development Co.

Tooele

Bingham West Dip Tunnel Co.
 Gold Bond Mining & Milling Co.
 H. T. & C. Co.
 International Smelting & Ref. Co.

Wendover

Desert Island Mining Co.
 Gethin Le Roy United Mines Co.
 Indicator Mining Co.

UINTA

Uteland

Uteland Mining Co.

UTAH

American Fork

Deer Creek Development Co.
 Julia Mining & Milling Co.
 Major Evans Con. Mng. & Mlg. Co.
 Miller Hill Mining Co.
 Miller Mining & Smelting Co.

UTAH (Continued).

American Fork

Mineral Flat Mining Co.
 Mountain Dell Con. Mining Co.
 Osburn Con. Mining & Mlg. Co.
 Pittsburg Consolidated Mining Co.
 Signet Gold & Copper Mining Co.

Goshen

Uncle Joe Mining Co.

Santaquin

Copper Bullion Mining Co.
 Eagle Copper Mining Co.
 Granite Mining & Milling Co.

Springville

Copper Cliff Mining & Milling Co.

Tintic

Colorado Mining Co.

WASATCH

Heber

Decker Canyon Mining Co.
 Mountain Lake Mining Co.

Snake Creek

Anchor Mining Co.
 Columbus Mining Co.
 Silver Queen Mine

WASHINGTON

Dirie

Utah & Eastern Copper Co.

WEBER

Ogden

Del Verde Tunnel Co.
 Elkhorn Gold & Copper Mining Co.
 So. Pacific Gold & Cop. M. & M. Co.
 W. Pacific Gold & Cop. M. & M. Co.

Vermont

ORANGE

Corinth

Pike Hill Mines, Inc.

So. Strafford

Vermont Copper Co.

*Orange Mine**West Fairlee*

Copperfield Mines

Virginia

CHARLOTTE

Red Oak

Carnegie Copper Co.

HALIFAX

High Hill

Virginia Copper Mine

So. Boston

Kay Mine Smelting Co.

Virgilina

Holloway Mine
 Motherlode Copper M. Co.
 Pontiac M. Co.
 Seaboard Copper Co.

LOUISA

Mineral

Arminius Chemical Co.
 Sulphur M. & R. R. Co.

MADISON

Stanley

Blue Ridge Copper Co., Inc.

NORFOLK

West Norfolk

Norfolk Smelter
 Virginia Smelting Co.

PRINCE WILLIAM

Dumfries

Cabin Branch M. Co.

RAPPAHANNOCK

Reager

Moqui Copper Co.

ROCKINGHAM

Elkton

High Top M. Corporation

WARREN

Front Royal

Gooney Manor Copper Co., Inc.

Washington

CHELAN
Chelan
 Cascade Gold & Copper Mining Co.
Leavenworth
 Chelan Consolidated Copper Co.
 Seattle Copper & Asbestos Co.
Lucerne
 Aurelia Crown Co.
 Deerfly Mining Co.
 Glacier Peak Mining Co.
 Holden Gold & Copper Mining Co.
 King Solomon Mining Co.
Stehelkin
 Butte Gold, Silver & Copper Co.
CLARKE
Washougal
 Washougal Gold & Copper Mng. Co.
FERRY
Curlew
 Phoenix Gold & Copper M. & M. Co.
 Rio Tinto-Treadwell Mining Co.
Danville
 Lucille Dreyfus Mining Co.
 Mineral Hill Tunnel & Cop. Mng. Co.
 Shonoe Mining & Milling Co.
Keller
 Bridge Creek Mining Co.
 Byrne Mining & Smelting Co.
 Copperopolis Mining & Leasing Co.
 Iconoclast Consolidated Mines Co.
 Illinois Copper & Silver Mining Co.
 Keller & Indiana Con. Smelting Co.
 Lorraine Copper Mining Co.
 Manila Mine
 Meadow Creek Cop. & Molyb. Co.
 Silver Creek Mining & Milling Co.
 Tenas Mining Co.
 Walla Walla Copper Mining Co.
Laurier
 Laurier Mining Co.
Meteor
 Gwinn Mining Co.
Orient
 Copper Butte Mining Co.
 Kettle River Mine
 McKinley Mining Co.
 Orient Gold Mines, Ltd.
 White Elephant Mine
Republic
 Apollo Consolidated Gold Mng. Co.
 Belcher Mining Co.
 Ben Hur Leasing Co.
 Ben Hur Mining & Milling Co.
 Copper Key Mines, Inc.
 Oversight Mining & Milling Co.
 Winnipeg Mining Co.
Rockcut
 Salina Group
JEFFERSON
Iron Mountain
 Tubal-Cain Copper & Man. Mg. Co.
KING
Baring
 Climax Group Mining Co.
 Low Creek Copper Co.
Berlin
 Bergeson Mining Co.
 Foss River Consolidated Cop. Co.
 Gold Mountain Mining Co.
 Seattle Cascade Mining Co.
 Superior Mining Co.
North Bend
 Horseshoe Mining Co.
KITTITAS
Cle Elum
 Devine Mining Co.
 Hellan Mining Co.
LEWIS
Mineral
 Washington-Iowa Copper Mining Co.
Vance
 McCoy Creek Mines Co.

OKANOGAN

Chesaw
 Apex Mining Co.
 Bolster Mining Co.
 Butcher Boy Mining Co.
 Grant Consolidated Cop. Mng. Co.
Conconully
 Boston Exploration Co.
 Conconully Copper Co.
 Lone Star Mine
 Penn-Wash Consolidated Mines Co.
 Salmon River Mining & Mfg. Co.
Loomis
 Copper World Extension Mng. Co.
 Copper World Gold Mg. & Smt. Co.
 Little Chopaca Mining Co.
 Q. S. Mining Co.
 Tillicum Development Co.
Methow
 Russia-Japan Mine
Nespelem
 Apache Mining Co.
 Multnomah Mng., Mfg. & Dev. Co.
 Rebekah Mining Co.
Nighthawk
 Favorite Gold & Copper Mng. Co.
 Number One Mining Co.
 Ruby Mining Co.
Oroville
 Detroit-Oroville Exploration Co.
 Oroville Consolidated Mining Co.
Tonasket
 Trinidad Mining & Smelting Co.
Twisp
 Alder Group Mining & Smelting Co.
 Crescent Copper Mining Co.
Winthrop
 Methow Gold & Copper Mining Co.
PEND OREILLE
Metaline
 Head Lake Gold-Copper Mining Co.
 Metaline Oriole Mining Co.
PIERCE
Longmire
 Eagle Peak Copper Mining Co.
Tacoma
 Tacoma Smelting Co.
SKAGIT
Cascade Mountains
 Silver Tip Mining & Power Co., Ltd.
Clear Lake
 Bald Mountain Mining Co.
Marblemount
 British Mining Co.
 Thunder Creek Mining Co.
 Thunder Creek Trans. & Smelt. Co.
SKAMANIA
St. Helens
 Bronze Monarch Mining Co., Ltd.
Spirit Lake
 Mount St. Helens Cons. Mng. Co.
SNOHOMISH
Darrington
 Bornite Copper & Gold Mining Co.
 Harley Gold Mountain M. & S. Co.
 Indiana-Darrington Mining Co.
 Tacoma Steel Co.
Everett
 Puget Sound Reduction Co.
Index
 Florence-Rae Copper Co.
 Galena Copper Mining Co.
 Gold Star Mining Co.
 Good Hope Gold & C. M. & Dev. Co.
 Gunn's Peak Copper Mining Co.
 Index-Bornite Copper Mining Co.
 Index Mining Co.
 New York Seattle Copper Mng. Co.
 Nonpareil Consolidated Copper Co.
 North Star Mining Co.
 Red Cross Mining Co.

SNOHOMISH (Continued).

Reiter

Bunker Hill Mining & Smelting Co.

Silverton

Bonanza Queen Mining Co., Ltd.

Copper Independent Cons. Mng. Co.

Eclipse Cons. Mining & Invest. Co.

Imperial Mining Co.

SPOKANE

Latah

St. Joe Mining & Milling Co.

STEVENS

Bluecreek

Liberty Copper Mining Co.

Bossburg

White Elephant Mine

Chewelah

Allan A'Dale Mining Co.

Amazona Mine

Arcade Mining Co.

Aurora Copper Mining Co.

Black Eagle Mining Co.

Butte-Chewelah Copper Co.

Checap Mining Co.

Chewelah Copper King Mining Co.

Chewelah Copper Mng. & Smtg. Co.

Copper Cliff Copper Mining Co.

Copper Hoard Mining Co.

Copper King Mine

Copper Queen Mining Co.

Eagle Mining & Smelting Co.

Fairview Group

Ham Group

Hecla Copper-Silver Mng. & Mlg. Co.

High Grade Silver & Copper Co.

Jay Gould Mining Co.

June Copper Co.

Krug Gold & Copper Mining Co.

Pacific Copper Mining & Milling Co.

Redwood Copper Mining Co.

Royal Copper Mining Co.

Security Copper Co.

Sprague Copper Co.

Standard Chewelah Mining Co.

Superior Copper Mining Co.

United Copper Mining Co.

United States Copper-Gold Co.

Windfall Mining Co.

Colville

Bear Mountain Mng. & Dev. Co.

Daisy

Hall Creek Mining & Milling Co.

Ione

Blue Jim Mining Co.

Gray Copper Mining Co.

Kettle Falls

Ark Group Mining & Milling Co.

Columbia River Gold Mining Co.

Cuba Mining & Development Co.

Silver Queen Mining Co.

Loon Lake

Kemp-Komar Copper Mining Co.

Marcus

Big Bear Mining & Dev. Co.

Metaline

Malden Mining Mlg. & Mfg. Co.

Napoleon

British Columbia Copper Co., Ltd.

Napoleon Mine.

Newport

Bead Lake Gold-Cop. M. Co.

Bornite Mining & Smelting Co.

Conquest Consolidated Mining Co.

Lone Star Copper Mining Co.

Northport

Aladdin Mining Co.

Northport Smelting & Ref. Co., Ltd.

Sunset Mining & Development Co.

Orient

Trojan Mine

Springdale

Cedar Canyon Smelting & Red'n Co.

Togo Mining & Smelting Co.

STEVENS (Continued).

Valley

Admiral Mining Co.

WHATCOM

Glacier

United States Modern Mining Co.

Maple Falls

Mount Baker & Shuksan Mining Co.

YAKIMA

North Yakima

Elizabeth Gold Hill Mining Co.

Wisconsin

ASHLAND

Mellen

Baraba M. Co.

Holmes M. & M. Co.

DOUGLAS

Gordon

Rudolph Land Co.

Superior

St. Croix Cons. Copper Co.

Superior & Boston Copper M. Co.

FLORENCE

Homestead C. G. & S. M. Co.

Wyoming

ALBANY

Albany

Medicine Bow's Mines Co.

Centennial

Mohawk G. & C. Co.

Utopia M. & M. Co.

Esterbrook

Boston & Wyoming Copper M. Co.

Three Cripples M. Co.

Holmes

American Copper Co.

Platinum M. & M. Co.

Rambler Copper & Platinum Co.

Shawnee-Wyoming Copper M. Co.

Jelm

Annie M. Co.

Laramie

Acme Cons. G. & C. M. Co.

Acme G. & C. M. Co.

Leslie

Strong Copper M. Co.

Ulcabomo M. & M. Co.

BIGHORN

Clark Fork

Crandall Copper M. Co.

Meteetse

Galena Ridge M. Co.

Shoshone Mountain M. Co.

Painter

Winona Gold-Copper M. & M. Co.

CARBON

United States M. Co.

Arlington

Big Five Copper Co.

Kimball M. Co.

Battle

Copper Age M. & S. Co.

Pluto G. & C. M. Co.

Copperton

Anchoria Copper M. Co.

Cerulean Copper M. Co.

Jack Pot M. & M. Co.

Stemp Springs Coal & Power Co.

Dillon

Azurite M. Co.

Congo M. Co.

Independence M. Co.

Leighton-Wyoming M. Co.

Oshkosh-Wyoming M. Co.

Encampment

Colowyo Dev. Co.

Continental-Morris Copper M. Co.

Copper Rock Gold M. & M. Co.

Elk Mountain M. & M. Co.

Elkhorn Copper M. Co.

Garland Copper M. Co.

CARBON (Continued).

Encampment

Imperial Copper & Gold M. Co.
 Manhattan Cons. M. & M. Co.
 Penn-Wyoming Copper Co.
 Savage Copper Co.
 Snake River Cons. M. Co.
 Standard Copper M. Co.
 William Penn M. Co.
 Wyoming Copper & Gold M. Co.

Morgan

Rip Van Winkle C. Gold M. & M. Co.

Rambler

Doane-Verde M. Co.
 Itmay Mine
 West Virginia-Wyoming Cop. M. Co.

Riverside

Aetna M. Co.
 What Cheer Copper M. Co.

Rudefeha

Ferris-Haggarty Copper M. Co.
 Haggarty Copper M. Co.
 Home Run Copper M. Co.
 United Smelters, Railway & Cop. Co.

Saratoga

Alameda M. Co.
 Badger State M. & M. Co.
 Camperdown Group
 Copper Bar M. Co.
 Island City Copper M. Co.

Walcott

Elkhart Mine
 Walcott Copper M. Co.

CONVERSE

Clarence

Oriole Copper M. Co.

Douglas

Maggie Murphy Copper Co.

Esterbrook

North Laramie Peak Copper M. Co.

Lusk

Copper Belt Mines Co.
 Wyoming G. & C. M. Co.

CROOK

Sundance

Gold Cliff M. Co.

FREMONT

Depass

Big Horn Copper M. & Dev. Co.
 Williams Luman M. Co.

Shoshoni

Fremont Dev. Co.
 Gold Nugget M. & M. Co.
 Lost Cabin M. Co.

South Pass

Wyoming Copper M. Co.

Thermopolis

Wertz Mine

JOHNSON

Hazleton

Bull Camp M. Co.

LARAMIE

Cheyenne

Henley Cons. Mines

Granite Canyon

Great Standard Copper M. Co.

Hartville

Copper Bottom M. & M. Co.

Hecla

Arizona Mine
 Hecla Cons. Mines Co.

Wheatland

Emerald M. Co.

CANADA

Capitals represent districts; italics,
 towns and localities.

British Columbia

ATLIN

Aldermere

Silvered Copper Mining Co.

ATLIN (Continued).

Quatsino

Copper Mountain Mng. & Dev. Co.
 Old Sport Group,

BOUNDARY

Bridesville

Copland Mining & Dev. Co.

Fairview

Dominion Fairview Cop. Co., Ltd.
 King Edward Mines, Ltd.

Franklin

McKinley Mines, Ltd.

Grand Forks

Volcanic Mine

Greenwood

Argo Mng. & Tunnel Co., Ltd.
 British Col. Copper Co., Ltd.
 Elkhorn Mining Co., Ltd.

Phoenix

British Col. Phoenix Syn., Ltd.
 Granby Cons. M. S. & P. Co., Ltd.
 Mother Lode Mines
 New Dominion Copper Co., Ltd.
 Phoenix Mng., Sm. & Dev. Co., Ltd.
 Snowshoe Gold & Copper Mines, Ltd.

KAMLOOPS

Kamloops

British Col. Explor'n., Ltd.
 Copper King Mine
 Iron Mask Mine
 Kamloops Copper Co.
 Kamloops Mine, Ltd.

KOOTENAY

Golden

British Am. Copper M. & Sm. Co.

Moyie

St. Eugene Mine

Sandon

Goodenough Mines, Ltd.

Wilmer

Flarmigan Ms., Ltd. of the Selkirks

NELSON

Nelson

Eureka Copper Mines, Ltd.
 Hall Mng. & Sm. Co., Ltd.
 Kootenay Bonanza Mines, Ltd.
 Queen Victoria Mine
 Silver King Mines, Ltd.

PORTLAND CANAL

Port Simpson

Hidden Creek Copper Co., Ltd.
 Race Horse Group
 Red Point Group
 Ruth Francis Group

QUEEN CHARLOTTE

Jedway

Hercules Mining Co.
 Ikeda Mines, Ltd.
 Ingenika Finlay River Dev. Co.
 Iron Mountain Mng. Co.
 Jedway Copper Co.
 Lily Group Mining Co.
 Moresby Island Mines, Ltd.
 Red Raven Mng. Co.
 Skincuttle Mng. Co.
 Tassoo Mng. & Sm. Co.

RAINY HOLLOW

Rainy Hollow

Empire Copper Syn., Ltd.
 Rainy Hollow Copper Mine.

ROSSLAND

Rossland

Cons. M. & S. Co. of Canada, Ltd.
 Fife Mines, Ltd.
 Giant-California Mng. Co., Ltd.
 Le Roi Mng. Co., Ltd.
 Le Roi No. 2, Ltd.
 Richmond Cons. Mines Co.
 Rossland-Kootenay Mng. Co., Ltd.
 Spitzee Mng Co., Ltd.
 War Eagle Mine

Trail

Iron Horse G. C. Mg. Co.

ROSSLAND (Continued).

Trail

Trail Smelter.

SIMILKAMEEN

Hedley

Kingston G. & C. Mng. Co.

Keremeos

Keremeos Copper Co.

Olalla

Olalla Copper M. & S. Co.

Princeton

Columbia Copper Mng. Co.

Oregon & B. C. M. & Dev. Co., Ltd.

Similkameen M. & Sm. Co., Ltd.

United Empire Co., Ltd.

SKEENA

Gribbell Island

Gribbell Island Copper Co.

Hazelton

Owen Lake Mine

New Hazelton

Butte & Rocher de Boule Copper Co.

Great Ohio Copper Mine

Rocher de Boule Copper Co.

Stewart

Bitter Creek Mng. Co.

Red Cliff Extension Mng. Co.

Red Cliff Mng. Co.

VANCOUVER

Howe Sound

Britannia M. & S. Co., Ltd.

Fitzsimmons Group

Howe Sound Co.

Red Mountain Copper Group

Swanson Bay

Western Copper Group

Texada Island

Canadian Am. Explor. Co., Ltd.

Cornell Mine

Lasquetti Island Mng. Co., Ltd.

Little Billy Operating Co.

Loyal Lease Co., Ltd.

Malaspina Mine

Marble Bay Mine

Norsemen Explor. Co.

Tacoma Steel Co.

Van Anda C. & G. Mines, Ltd.

Valdez Id.

Morrin Group

VANCOUVER ISLAND

American Canadian Mg. Co.

Big Interior Copper Mine

Big Interior Gold Mines, Ltd.

Happy John Mine

Helga G. & C. Co.

King Solomon Mine

Mt. Sicker & Brenton Mines, Ltd.

Mt. Sicker & B. C. Dev. Co., Ltd.

Nanaimo Jubilee M. & Dev. Co., Ltd.

Ptarmigan Mines

Richard III Mg. Co.

Tye Copper Co., Ltd.

Vancouver Id. M. & Dev. Co., Ltd.

YALE

Ash Grove

Golden Sovereign Mine

Portland Mng. Co.

Hope

Aufeas Mines, Ltd.

Murphy Copper Mine

Manitoba.*Ingolf*

Boston Dominion Copper Co.

New Brunswick.*Dorchester*

Intercolonial Copper Co.

L'Etete

L'Etete Gold & Copper Mining Co.

Nova Scotia.

Cape Breton Copper Co., Ltd.

NOVA SCOTIA (Continued).

Cape Breton Pros. M. & D. Co., Ltd.

Cape D'Or Copper Dev. Co., Ltd.

Cheticamp Copper Co., Ltd.

Colonial Copper Co.

Dominion Mng. & Sm. Co.

Great Bras d'Or Gold Mng. Co.

Lake Copper Mng. Co.

Wentworth Copper Co., Ltd.

Ontario.

Allie Island Copper Mine

Lake Huron Copper Syndicate, Ltd.

ADDINGTON

Cloyne

Big Dipper M. & M. Co., Ltd.

ALGOMA

Bruce Mine

Algoma Copper & Smelting Co.

Bruce Mines, Ltd.

Dean Lake

Jury Copper Mines, Ltd.

No. Ontario Cons. Copper Co., Ltd.

S. S. Marie

Hillman Copper Co., Ltd.

Ranson Cop. Mng. Co. of Ont., Ltd.

Root River Gold & Copper Syn.

Sowerby

Two Lakes Copper Mng. Co., Ltd.

Sudbury

British American Nickel Cor.

Calumet & Algoma Mng. Co.

Calumet & Massey Copper Co.

Canadian Copper Co.

Canadian Nickel Cor., Ltd.

Dominion Nickel-Copper Co., Ltd.

Hermira Mining Co.

International Nickel Co.

Massey Station Mining Co., Ltd.

Mond Nickel Co., Ltd.

Teck

Dane Mining Co.

Superior Mine

Superior Copper Co., Ltd.

Thessalon

Algoma Cstms. Sm. & Ref. Co., Ltd.

King Edward Mine

FRONTENAC

Northbrook

Ore Chimney Mining Co., Ltd.

NIPISSING

Grey's Siding

Grey's Siding Dev. Co., Ltd.

Cobalt

Nipissing Copper & Silver Co., Ltd.

North Bay

Montreal Sm. & Red. Co., Ltd.

Sturgeon Falls

Fidelity Copper Co.

No. Ontario Red. & Ref. Co., Ltd.

PARRY SOUND

Parry Sound

Boston-Parry Sound Copper Co.

Columbia Copper Mng. Co.

Cons. Copper Co. of Parry Sound.

Parry Sound Copper Mng. Co., Ltd.

RAINY RIVER

Kashabowie

Tip Top Mine

THUNDER BAY

Port Arthur

Cambrian Mng. & Dev. Co., Ltd.

Quebec

BROME CO.

Bolton Center

Memphremagog Mining Co.

SHERBROOKE

Capelton

Albert Copper Co.

Ascot Mining Co.

Capelton Mine

SHERBROOKE (Continued).

Capelton
Nichols Copper Co.
Eustis
Eustis Mining Co.
Suffield
A. O. Norton
WOLFE CO.
Weedon
East Canada Smelting Co., Ltd.

Yukon.

Carcross
Yukon Dist. Gold Mines Dev. Co.
White Horse
Arctic Chief Copper Mines
Atlas Mining Co.
Copper King Mining Co.
Grafter Copper Mining Co.
New Atlas Mining Co.
Valerie Mine
War Eagle Mine

Newfoundland

Anglo-Newfoundland Dev. Co.
Buchan's Mine
Copper Mines of Newfoundland, Ltd.
Great Northern Copper Co.
Newfoundland Syndicate
Notre Dame Copper Co.
Pilleys Island Pyrites Co.
Reid-Newfoundland Co.
Terra Nova Properties, Ltd.
Tilt Cove Copper Co., Ltd.
Western Copper Co., Ltd.
York Harbour Mine, Ltd.

MEXICO

Capitals, states; italics, towns or districts.

The following companies operate in a number of localities in the Republic and therefore cannot be listed under any particular State:

American Metal Co., Ltd.
American Smelter Securities Co.
American Smelting & Refining Co.
General Development Co.
Guggenheim Exploration Co.
United States Sm., Ref. & Mng. Co.

AGUASCALIENTES

Ocampo
Aguascalientes Metal Co.
Aguascalientes Smelter
Asientos Mining Co.
Becker & Kuhlmann
Tabor y Anexas; Cia. Min. el

Tepezala

Asientos; Cia. Min. de
Fortuna, S. A.; Cia. Min. La

BAJA CALIFORNIA

Angeles Bay
Gulf Copper Co.

Caimalli

Tesora; Mina el

Ensenada

Esperanza Mining Co.
Sta. Catarina del Norte
Esmeralda C. M. & S. Co.
Evangelina C. Mng. Co.

Sta. Rosalia, Sur

Boleo; Compagnie du

CHIAPAS

Salto de Agua
Santa Fe; Mina

CHIHUAHUA

Baborigame
Rio Verde Copper Co.

Baca

Mexican Mines Corporation

Barreal

Lolita Mines Co."

CHIHUAHUA (Continued).

Batopilas
Jesus Marie de Baquerachic
Concheno
Virginia C. M., M. & Sm. Co.
Coyame
Las Vigas Mining Co.
Guaynopa
International G. & C. Mng. Co.
Jesus Maria Ocampo
Loreta y Providencia; Cia. Min.
Mary Mining Co.
Mayo Mining Co.
Jimenez
Dos de Abril Mining Co.
Gibosa Mine
Ignacio Rodrigues Ramos; Cia. Min.
Las Adargas Mining Co.
Marquez
Arados Copper Co.
Aurora y Anexas; Cia. Min. la
Madero Hermanos

Naica

Ramon Corona; Cia. Min.

Parral

Almoloya Mining Co.
Chihuahua Copper Mng. Co.
Hidalgo Placer Mng. Co.
Sta. Maria Mexico Mng. Ass'n.
Santiago Mining Co.
St. Andres del Rio
Barranca Copper Co.

San Pedro

Leon Mining Co.

Sta. Barbara

Granadena Mining Co.
Mapimi Smelter
Santa Rita; Cia. Min.

Sta. Eulalia

Parcionera Cons. Mng. Co.

Terrazas

American Exploration & Mining Co.
Rio Tinto Copper Co.

Uruachic

San Martin Mining Co.
San Timoteo M. & S. Co.
Uruachic M. & S. Co., Ltd.

COAHUILA

Monclova

Continental Mining Co.
Mexican Smelting Corporation

Otto

Jimulco Mining Co.

Rio Grande

Boca; Cia. Explor'a. Explot'a. de
las M. de la

Saltillo

Irene Mng., Sm. & Pros. Co.
Mazapil Copper Co., Ltd.

San Pedro de las Colonias

San Pablo; Cia. Min.

Sierra Mojada

Mexicana; Cia. Metalurgica

Viesca

Coahuila Mng. & Sm. Co., Ltd.
Torreon, S. A.; Cia. Metalurgica de
Union; Cia. Min. la

DURANGO

Cuencame

Copper Queen Mine
Wilhelmi Silver & Copper Co.

El Oro

Carmen Copper Co.
La Recompensa Mng. Co.

Gabriel

Evanston Mng. Co.

Guanacevi

Guanacevi Tunnel Co.

Inde

Mina el Caballo
Mina Carambola
Inde Reduction Co.
Union y Constancia; Minas

DURANGO (Continued).

- Magistral*
National Mines & Smelters Co.
- Mapimi*
Cinco de Mayo M. & S. Co.
Descubridora Mng. & Sm. Co.
Penoles Mng. Co.
- Muleros*
Guadalupe; Mina
- Panuco de Coronado*
Lucia Mining Co.
San Luis Mining Co.
- Pedricena*
Mexican Smelter Co.
- Rodeo*
Corrales Mng. & M. Co.
- San Bartolo*
Parral; Cia. Explotadora de
- San Fernando*
San Fernando; Mina
- San Francisco del Mezquital*
Buenavista Mng. Co.
- San Juan de Guadalupe*
Esperanzas Mng. Co.
San Acasio y Anexas; Cia. Min. de
- San Juan del Rio*
Avino Mines, Ltd.
- San Luis del Cordero*
Boca del Cobre Mng. Co.
- Sta. Maria del Oro*
Los Sauces; Mina de
- Tamazula*
Amazon Gold Co.
Briones; Felix
- Tejamen*
Duraznito; Cia. Min. el
- Tepehuanes*
Baca Ortiz; Cia. Restauradora de
- Velardena*
American-Mexico Mng. & Dev. Co.
Los Muertos Mng. Co.
San Mateo; Cia. Min.
Ternerres; Mina
Wilhelm S. & C. Co.

GUANAJUATO

- Leon*
American Mining Co., S. A.
Campechana o Positiva y Anexas,
S. A.; Neg. Min. la
- Pozos*
Pozos; Negociacion de
- San Luis de la Paz*
San Luis; Cia. Beneficiadora
- Silao*
Caridad; Cia. Min.

GUERRERO

- Campo Morado*
Reforma M. & M. Co.
- Chilpancingo*
Guerrero Copper Co.
- Petatlan*
Pacific Copper Co., Ltd.
Pacific Copper & Pyrites Co.
- Rio Balsas*
Maine & Nebraska Mining Co.
- Taxco*
Mexican Smelting & Ref. Co.
- Union; La*
Rio Grande & Dolores S. M. Co., Ltd.

HIDALGO

- Jacala*
Cortez Associated Mines
- Zimapan*
Chiripa y Anexas; Minas la
Hidalgo Copper M. & S. Co.
Loma de Toro, S. A.; Neg. Min.

JALISCO

- Ameca*
Bonanza Mining Co.
Cerritos Mine
Expectativa Mining Co.
Jalisco Mng. & Sm. Co.

JALISCO (Continued).

- Ameca*
Las Moras Group
Magistral-Ameca Copper Co.
Mascota Copper Co.
Quillilla; Cia. Explot. de la Mina de
Cobre
- Autlan*
Carrizo Copper Co.
Cuartas Mining Co.
Dargin & Richardson
Illinois-Jalisco Mining Co.
Ojo Verde Copper Co.
Volcancillos Mines
- Ayutla*
Ayutla Smelter
Azteca Mining Co.
Santa Edubijis Mine
Santa Rosa Mng. & M. Co.
- Etzatlan*
Aguila Amalgamated Mng. Co.
Almoleya y Anexas; Cia. de
Bellavista; Mina
- Guachinango*
Aztec Copper Smelting Co.
La Fe, Caridad y Anexas; Cia. Min.
- Hostotipaquillo*
Mex. Mines-Prospects Dev. Co., S. A.
San Felipe Mining Co.
U. S. & Mexican M. Co.
- Mascota*
Cabrera; Epigmenio
Caridad y Anexas; Cia. Min.
- San Martin Hidalgo*
La Regina Mining Co.
- Tapalpa*
Keystone Copper Smelter Co.
Keystone Mining Co.
Mercer-San Rafael Mining Co.
Mexicana Mining Co.
Realito Mining Co.
- Union de Tula*
Springfield-Mexican Mng. Co.
- Zapatitico*
Jalisco (Mexican) Mng. Syn., Ltd.
- MEXICO**
- Tejupitlo*
Sta. Maria de la Paz y Anexas, S.
A.; Cia. Min. y Ben. de
- Zacualpam*
Zacualpam, S. A.; Cia. Min.
- MICHOACAN**
- Anganguo*
Michoacan R'y. & Mng. Co., Ltd.
- Ario*
Ario Copper Co.
Castrejon Hermanos
Rio Tinto, S. A.; Cia. Min.
- Huetamo*
Irigoyen Hermanos y Cia.
- Inguaran*
D'Inguaran; Cia.
- Tacambaro*
Braniff y Ca., S. A.; Neg. Min. de
O. y T.
- Zitacuaro*
Arimex Cons. Copper Co.
Cobre; Cia. Min. el
- NUEVO LEON**
- Cerralvo*
Armendale Sucesores; Francisco
Carmen Ampliacion; Mines del
- Monterey*
Monterey M. S. & Ref. Co.
Monterey Smelter
Monterey Sm. & Ref. Co.
- Villaladama*
Maiz y Ca.; Joaquin
- OAXACA**
- Ixtlan de Juarez*
Oaxaca M., M. & Investment Co.
- Oaxaca*
National Natividad Copper Co.

OAXACA (Continued).

- Oaxaca*
 Oaxaca Cons. Copper Co.
Ocotlan
 La Fortuna Mng. Co.
 La Ventura M. & M. Co.
San Bartolo Coyotepec
 Pittsburg-Oaxaca Mng. Co.
San Martin de los Causecos
 San Martin y Anexas, S. A.; Cia. Min.
Tequisistlan
 Mascota, S. A.; Negocion Min.
Vila Alta
 Santa Gertrudis Mines, Ltd.
PUEBLO
Acatlan
 Oest; Alfredo
Cuyuato
 Puebla Sm. & Ref. Co.
San Juan
 Bankers Mng. & Dev. Co.
Teziutlan
 Aurora; Mina la
 Teziutlan Copper Co.
 Teziutlan Copper M. & Sm. Co.
SAN LUIS POTOSI
Charcas
 Bibiana; Mina
 Irizar; Salvador
 Moctezuma Mining Co.
 Tiro General; Cia. Minera del
 Tiro General de Charcas Mine
 Trinidad de Charcas, S. A.
Matehuala
 Concepcion y Anexas; Cia. Min. la
 Corpus Christi; Nueva Cia. Min. de
 Dolores Mine y Anexas
 Matehuala Smelter
 National Metallurgical Co.
 Rubi; Cia. Min.
 San Francisco Group
 Sta. Maria de la Paz y Anexas; Neg
 Valenciana Mng. Co.
Moctezuma
 Aurelio Hiriart
Salado (El)
 Nacional; Cia. Min. la
 Saltillo M. & M. Co.
San Luis Potosi
 San Luis Potosi Smelter
SINALOA
Choix
 Choix Cons. Mng. Co., Ltd.
 El Magistral Copper Co.
 Los Platanos Mng. Co.
 Los Platanos, S. A.; Cia. Explor. de
 San Lucas Copper Co.
Culiacan
 Cuchara; Cia. Min.
Mocorito
 West Coast Mng. & Sm. Co.
Sinaloa
 Sinaloa Sm. & Ref. Co., S. A.
SONORA
Alamos
 Alamos Mining Co.
 Anita Copper Mines Co.
 Antigua Copper Co.
 Cerro del Cobre Mng. Co.
 Cobriza y Anexas; La Cia. Min.
 Esquer y Cia.; Alexander
 German-American Copper Co.
 International C. & G. Co.
 Mayo Mines of Mex., Ltd.; El
 Mexican Exploration & Mining Co.
 Mexican Mining Co.
 Pacific Mng. & Sm. Co.
 Piedras Verdes y Anexas; Cia. Min.
 Plata Fina Mng. & Dev. Co.
 Quintera Mng. Co., Ltd.
 Reina de Cobre; Mina
 Santa Cruz Mng. Co.
 Santa Fe C. & G. Mng. Co.

SONORA (Continued).

- Alamos*
 Sombreréttillo Mining Co., S. A.
 Sonora Central Mines Co.
 Southern Sonora Dev. Co.
 Zambona Dev. Co.
Agua Prieta
 Atlas Exploration & Mng. Co.
Altar
 Lake Superior & Sonora Dev. Co.
 Ohio-Mexican Mng. Co.
Arizpe
 Carmen Cons. Copper Co.
 Cubana Cons. Copper Co.
Bacoachi
 El Triunfo Cons. Mng. Co.
Cabullona
 Cobre Grande Copper Co.
Cananea
 Abundancia Mng. Co., S. A.
 Arizona Cananea Mines Corporation
 Arizpe Mines Co.
 Beacon Cons. Mines Co.
 Bonanza de Cobre Co.
 Brooks Cons. Copper Co.
 Calumet & Sonora M. & M. Co.
 Cananea Boston Cons. Mng. Co.
 Cananea Boston Mng. Co.
 Cananea Cons. Copper Co., S. A.
 Cananea Dev. Co.
 Cananea Eastern Mng. Co.
 Cerrito Mng. Co., S. A.
 Democrata Cananea Sonora Cop. Co.
 Dispatch Mining Co.
 Dolores Mng. & Dev. Co.
 Duluth Sonora Copper Co.
 Elenita Dev. Co.
 Empire Mng. Co.
 Fay-Cananea Copper Co.
 Greene Cananea Copper Co.
 Greene Cons. C. Co.
 Indiana-Sonora C. & M. Co.
 Josefina Mine
 Juanita Mining Co., S. A.
 La Cobriza de Cobre
 Lomita Mining Co., S. A.
 Mexican Metals Co.
 Mexico Grande Mng. Co.
 Mexico Mine Co. (Mina Mexico)
 Moctezuma Arizpe Dev. Co.
 San Bernado Mining Co.
 San Pedro Copper Co.
 Sta. Teresa Mng. Co.
 Suisun Claim
 Superior Bonanza Mng. Co.
 Victor Mng. & Sm. Co.
Carbo
 Alma Copper Mng. Co.
 Copete Cons. Copper Co.
 Copete Mng. Co.
 Giroux Cons. Mng. Co.
 Lluvia de Cobre Mng. Co.
 Meizer Mng. Co.
 Tecolote Copper Co.
 West Coast Sm. & Ref. Co.
Copete
 Belene Copper Co.
Cumpas
 Archipielago Mine
 Belen Mining Co.
 Minneapolis Copper Co.
 Ormus Mine
 Transvaal Mng. Co. of Utah
 United Mexican Mines Co.
Fronteras
 Cobre Grande Copper Co.
 Cons. Sonora Mines Co.
 Santa Rosa Mine
 Union Mine; La
 Virginia Dev. Co.
Guaymas
 American-Mexican Sm. & Ref. Co.
 Guaymas Smelter (Pacific Sm. Co.)

SONORA (Continued).

Guaymas

Mexican-American Sm. & Ref. Co.

Pacific Smelting Co.

Hermosillo

Hermosillo Copper Co.

Mexican Mng., Ref. & Explor'n Co.

Monarca Copper Co.

Huepac

Washington Mines Dev. Co.

Imuris

Bonanza Mg. Co.

Yaqui River Cons. G. & C. Co.

Sonora Bonanza.

Izabal

See Yzabal

Lampazos

Promontorio Cons. Mng. Co.

Magdalena

Caracahui Mountain Copper Co.

Cerro Azul Mining Co.

Esmeralda Copper Co.

Guerrero Mining Co.

Moctezuma

Cuatro Grande Mining Co., S. A.

Duluth Moctezuma Mining Co.

San Juan Bautista Mng. Co.

Sonora Dev. Co.

Naco

Seattle Copper Mng. Co.

Nacozari

Arizona Mng. & Realty Co.

Arizona Mng. & Trading Co.

El Globo M. & M. Co.

El Van Copper Co.

Harris Copper Co.

Moctezuma Copper Co.

Phelps Dodge & Co.

Picacho Mng. Co.

Rosario Mine

Tabatacachi Mining Co.

Tharsis York Co.

Noria

Amelia Copper Mine

International Copper Ore Co.

La Cobreza Mng. Co.

Sonora Copper Sm. Co.

Sonora Pacific Mng. Co.

Pilares

Le Roy Mining Co.

Nacozari Cons. Copper Co.

Silver Seal Mining Co.

Sahuaripa

Baja y Sta. Rosa

Bufa M., M. & Sm. Co.

Cadena de Cobre Mng. Co.

Cieneguita Cons. Mines

Garretson Sahuaripa Co.

Rey del Oro Mng. Co.

Trenton Sonora Mng. Co.

San Antonio de la Huerta

Metal de Cobre; Cia. Min.

Rio Yaqui Copper Co.

River Copper Co.

San Antonio Copper Co.

San Felipe

Denver Sonora M. & M. Co.

Sonora Copper Mng. Co.

San Javier

Colorado Mina

La Reina Union Mng. & Red. Co.

Ohio Yaqui Mining Co.

San Xavier Copper Co.

Sonora Exploration & Metals Co.

Santa Cruz

Arnold Mng. Co.

Manhattan Dev. Co.

Note: For companies not in this list, consult the Dead List, Part V.

SONORA (Continued).

Soyopa

Calumet & Yaqui River Copper Co.

Northern Sierra Madre Mng. Co.

San Juan Grande Mine

Suaqui de Batuc

Creston Copper Co.

International Sm. Co.

Sonora Chief Mng. Co.

Tesora de Sonora Mng. Co.

Suaqui Grande

Gordonera Mining Co.

Toledo

Sonora Mng. & Dev. Co.

Tonichi

Chicago Explor'n. & Dev. Co.

Mina Mexico Co.

Tri-Metallic Sm. & Ref. Co.

Torres

La Dura Mining Co.

Ures

Colorado Mine

Dividend Mng. & Sm. Co.

Mazatan C. & G. Mng. Co.

Mills & Co.; Chas. S.

Richfield Copper Co.

Rubena Mining Co.

Yaqui Canyon Copper Co.

Yaqui Copper Co.

Yaqui Mining Co., S. A.

Yaqui Sm. & Ref. Co., S. A.

Yzabel

Bartolino Hermanos

Santa Fe Cons. Mng. Co.

Sonora Explor'n. Co.

TEPIC

Santiago Ixcuintla

Cardenillo y Amadillo; Minas

Acaponeta

Cucharas Mining Co.

VERA CRUZ

Jalacingo

Zomelahuacan, S. A.; Cia. Min. de

ZACATECAS

Chalchihuites

Chalchihuites, S. A.; Cia. Ben. de

Min. de

Chalchihuites Mining Co., S. A.

Esmeralda; Negociacion Minera

Huirachic; Cia. Min. de

National Smelting Co.

El Eden

El Eden; Cia. Min. y Ben.

Guadalupe

Rio Tinto; Cia. Min.

Mazapil

Alicante; Cia. Min. el

Saltillo, S. A.; Cia. Min. del

Ojo Caliente

Revancha; Mina la

San Pedro

Tres Senores Mng. Co.

San Salvador

Protectora y Anexas; Cia. Min. la

Santa Rosa

Explor'n. Co. of Eng. & Mex., Ltd.

Santa Rosa Mng. Co., Ltd.

Veta Grande

Cardona; Daniel

Villa Nueva

Leonora y Huerta; Minas

Zacatecas

Gomez Castellanos; Antonio

Magistral, S. A.; Neg. Min. del

San Bernabe y Anexas; Cia. Min.

San Roberto Mng. Co.

Santiago Mining Co.

GEOGRAPHICAL INDEX OF FOREIGN MINING COMPANIES.

A list of all foreign copper mines and mining companies in Africa, Asia, Australasia, Central America, Europe, Oceanica, South America and West Indies, arranged under the names of their respective countries.

AFRICA.

ALGERIA

Achaïches; Soc. Anon. d. Mines d.
Cuivre de
Ain-Barbar; Compagnie des Mines d'
Algerie; Cie. Industrielle et Minière
des Cuivres d'
Bou-Thaleb; Soc. des Mines du
Djebel Ouenza Mine
Kef-Oum-Theboul Mine
Mouzaia; Soc. Anonyme des
Ouasta et de Mesoula; Cie. des
Mines d'
Oued-Mougras Cop. & Iron Co., Ltd.
Ouenza; Soc. Concessionnaire des
Mines d'
Syndicat Minière; Soc. du
Tadergount Mine

CAPE PROVINCE

Anglo-German Territories, Ltd.
Areachap Copper Mines, Ltd.
Cape Copper Co., Ltd.
Copper Queen, Ltd.
East Griqualand Copper & Nickel M.
Co., Ltd.
Insizwa Nickel & Cop. Dev. Co., Ltd.
Nababeep Mine
Namaqua Copper Co., Ltd.
Nolangen Nickel & Cop. Syn., Ltd.
O'okiep Mine
Rooputs Copper Co.
Turnstream Copper M. & D. Co.
Tweefontein Mine

BELGIAN CONGO

Kambove Copper Mine
Katanga; Cie. du
Union Minière de Haut Katanga

FRENCH CONGO

Congo Français; Cie. Minière du
Congolaise; Soc. Minière

GERMAN S. W. AFRICA

"Gorob"; Deutsch S. W. A. Kupfer-
minen Ges.
Hanseatic Mining Co.
Khan Kupfergrube, Ltd.
Kunjas Copper Mines
Otavi Exploring Syndicate, Ltd.
Otavi Mines & Railway Co.
South African Territories, Ltd.
Southwest Africa Co., Ltd.
Swakopmunder Minengesellschaft

NATAL

Buffels River Mine
Dania Copper Mines
N'Kandhla Syndicate, Ltd.
Subeni Mine

PORTUGUESE E. AFRICA

Edmundian Copper Mine
Edmundian Copper Mining Co.
Mozambique Co., The
Zambesi Consolidated, Ltd.
Zambezia; Companhia da

PORTUGUESE W. AFRICA (ANGOLA)

Bembi Mine
Senze Copper Mine, G. m. b. H.

RHODESIA

Amalgamated Properties of Rho-
desia, Ltd.

RHODESIA (Continued).

Bechuanaland Copper Co., Ltd.
Bechuanaland Exploration Co., Ltd.
British South Africa Co.
Bwana M'Kubwa Cop. Mg. Co., Ltd.
East Gwanda Mines, Ltd.
Falcon Mines, Ltd.
Kafue Copper Dec. Co., Ltd.
New Rhodesia District Dev. Co., Ltd.
New Rhodesia Mines, Ltd.
North Zambesia Concessions, Ltd.
Northern Copper Co. (B.S.A.), Ltd.
Rhoab Mines of Rhodesia, Ltd.
Rhodesia Consolidated, Ltd.
Rhodesia Copper & General Explora-
tion & Finance Co.
Rhodesia Katanga Junction Ry. &
Mineral Co., Ltd.
Rhodesian & General Corp., Ltd.
South African Copper Trust, Ltd.
Tanganyika Concessions, Ltd.
Umkondo Mine
Zambesia Exploring Co., Lt.

SUDAN

Hofret el Nahas Mines

TRANSVAAL

Bailey's Copper, Ltd.
Barborton Copper Co., Ltd.
Barborton Exploring & Dev. Co., Ltd.
Bower's Randfontein, Ltd.
De Kaap Copper Mines, Ltd.
D'Jelee Copper Syndicate.
Dora Copper Mines, Ltd.
Guide Mining Co.
Henderson's Transvaal Estates
H. E. Proprietary, Ltd.
Hickey & Browne
Malgo Developing Syndicate, Ltd.
Messina (Transvaal) Dev. Co., Ltd.
Motale Copper Dev. Syndicate, Ltd.
New Stratan Coppers, Ltd.
Pretoria Copper & Tin Fields, Ltd.
Randfontein Extensions, Ltd.
Rietfontein (T. C. L.), Ltd.
Terry Copper Syndicate, Ltd.

TUNIS

Djebel Chouchia Mine

ASIA

CEYLON

Eastern Development Corp., Ltd.

CHINA

Kan-Hsien Mine

JAPAN

Adakai Mine
Akanumada Mine
Akayama Mine
Akutozawa Mine
Ani Mine
Arakawa Mine
Ashio Mines
Ate Mine
Besshi Mine
Daiji Mine
Dogamaru Mine
Fujita Co. (Gomei Kwaisha Fujita-
gumi)
Fukada Mine

JAPAN (Continued).

Furokura Mine
 Furukawa M. Co.
 Gomei-Kwaisha Fujitagumi
 Hanaoka Mine
 Hatasa Mine
 Heihachi Tanaka
 Hibira Mine
 Hiragane Mine
 Hisanchi Mine
 Hisanosuki Ishihara
 Hitachi Mine
 Hokoishi Mine
 Homanzan Mine
 Honjyo Copper Works
 Jimori Mine
 Ikuno Mine
 Inari Mine
 Innai Mine
 Jiro Sato
 Junta Koide
 Kajitani Mine
 Kamaishi Mine
 Kamioka Mine
 Kano M. Co.
 Kawaiyama Mine
 Kichizayemon Sumitomo
 Kokusei Mine
 Komaki Mine
 Kosaska Mine
 Kune Mine
 Kusakura Mine
 Kyosaku Taked
 Makimine Mine
 Maze Mine
 Mihara Mine
 Mitsu Bishi-Goshi Kwaisha
 Mitsui M. Co.
 Mizusawa Mine
 Morotaka Yakata
 Nikko Copper Works
 Obye Mine
 Ogoya Mine
 Ota Mine
 Sado Mine
 Sumitomo Copper Co.
 Terano Mine
 Tsubaki Mine

KOREA

Collbran-Bostwick Development Co.
 Kapsan Concessions, Ltd.
 Seoul Mg. Co.

INDIA

Baragunda Mines
 Chota Nagpur Mines
 Eastern Development Corp., Ltd.
 Rai Mine
 Rajdoha Mine
 Rakha Hills Mine

SIBERIA

Atbasar Copper Fields, Ltd.
 Dzhitav Works
 New Central Siberia, Ltd.
 Siberian Copper Co.
 Spassky Copper Mine, Ltd.
 Yenisei Copper Co., Ltd.
 Yuspensski Mine

TURKESTAN

Kokand Copper Mines
 Loganoff; Prince G. G.
 Nazarov & Co.
 Naukat Syndicate
 Novikoff & Co.

AUSTRALASIA.

The Australian Commonwealth.

NEW SOUTH WALES

Ace Mine
 Alpha Copper M. Co., N. L.
 Apsley Mine

NEW SOUTH WALES (Continued.)

Attunga Copper M. Syndicate
 Beechworth Gold M. Syndicate
 Bencree G. & C. Mines, N. L.
 Blayney Cop. Mines & Sm. Co., N. L.
 Blue Creek Mine
 Bob's Mount Mine
 Bogan River Copper M. Co., N. L.
 Bonnie Dundee M. Co., N. L.
 Boppy Broken Hill Cop. Mine, N. L.
 Breadalbane M. & S. Syndicate, Ltd.
 Brebo Cop., Sil. & Lead M. Co., N. L.
 Budgery King Copper M. Co., N. L.
 Budgery Mines, N. L.
 Budgerygar M. Co., N. L.
 Budgerygar North
 Bundarra Mine
 Cadia Copper M. & S. Co., Ltd.
 Cadia Extended Mine
 Calvert G. & C. Co.
 Canbelego, Ltd.
 Cobar Copper, Ltd.
 Cobar Freehold Copper M. Co., N. L.
 Cobar-Gladstone M. Co.
 Cootamundra Mine
 Copper Well M. Co., Ltd.
 Crowl Creek South Cop. M. Co., N. L.
 C. S. A. Mines, Ltd.
 Eclipse Mine
 Electrolytic R. & S. Co. of Aus., Ltd.
 Emerald Mine
 Esmeralda Mine
 Fort Bourke Copper M. Co., N. L.
 Girilambone Copper M. Co., Ltd.
 Gladstone Mine
 Glamorgan Copper Options Synd.
 Goodrich Proprietary
 Goulma Copper Options Co.
 Grafton Copper M. Co., Ltd.
 Great Cobar, Ltd.
 Great Cobar North, Ltd.
 Great Hermidale South Copper Co.
 Great Northern Copper Sm. Co.
 Gulf Creek Copper Mine
 Kagalra Mines, Ltd.
 Kyloe Copper Mines, N. L.
 Lake George Mine
 Lithgow Smelter
 "Lloyd" Copper Co., Ltd.
 Lobbs Hole Copper Mine, N. L.
 London Metal Banking Co., Ltd.
 Melrose Copper Mine
 Mount Boppy Block No. 51, N. L.
 Mount Boppy Copper M. Co.
 Mount Browne Copper & Gold M. Co.
 Mount Bulga Copper Co.
 Mount Carrington Copper Mine, N. L.
 Mount Costigan & Cordillera Co.
 Mount Hope Mines, N. L.
 Mount Royal Mine
 Mountain Run Mine
 Mouramba Copper Mines, Ltd.
 New South Wales Mines & Sm. Co.
 North Cobar Limited.
 North Mount Boppy, Ltd.
 Nymagee Copper, Ltd.
 Nymagee Copper Co., Ltd.
 Overflow Mines, N. L.
 Port Kembla Smelter
 Queen Bee Copper M. Co., N. L.
 Secret Copper M. Co., N. L.
 Snowball Copper M. Co., N. L.
 Tolwong Mineral Co., Ltd.
 Underlay Mine
 Yarrangobilly Copper M. Co., N. L.

NORTHERN TERRITORY

Carters Consolidated, Ltd.
 Daly Copper Mining Co.
 Daly River Copper Mine
 Day Dream & Bretonarte Cop. M. Co.
 Finniss River Copper Mine
 Flinders Copper Mine

NORTHERN TERRITORY (Continued.)

Great Carpentaria Copper M. Co.
 Mount Coffin Copper Mine
 Mount Diamond Mine
 Mountain of Light Mine
 Northern M. & S. Co.
 Northern Territory Options, Ltd.
 Paull's Con. Mine
 Wild Dog Copper Mine

QUEENSLAND

Aldershot Smelter
 Amal. Victory Copper Mg. Co., Ltd.
 Anniversary Copper Mines, Ltd.
 Answer Mine
 Apple Tree Copper Co.
 Atlanta Mine
 Barry Copper Prospecting Synd.
 Boolboonda Copper Synd., Ltd.
 Buchanan Copper Mines, Ltd.
 Cambria Copper & Gold Mines Co.
 Carella Copper Co.
 Carrington's Lion & 2 East G. & C. Co.
 Carrington United Mines Co., Ltd.
 Chillagoe, Ltd.
 Cloncurry C. & G. Exploration Co., Ltd.

Cloncurry Syndicate, Ltd.
 Commodore Mine
 Corella Copper Co., N. L.
 Culgoa Mines
 Daintree Copper Mine
 Dobbyn Mine
 Duchess Mine
 Eclipse Mine (Chillagoe Co.)
 Einasleigh Freehold Cop. Mines, Ltd.
 Einasleigh Mine
 Eleanora Copper Mine
 Era Mng. Properties Dev. Synd., Ltd.
 Etheridge Gold Mines
 Federal Reward Claim
 Fitzroy Mine
 Florodora Mine
 Fortunatas Mine
 Glassford Creek Mine
 Gossan Mine
 Great Australian Freehold C. Co.
 Great Australian Mine
 Great Fitzroy Mines, Ltd.
 Hampden Cloncurry Cop. Mines, Ltd.
 Hampden Consols Mine
 Hampden South Consols Mine
 Harpurs Hill Mine
 Irvinebank Mng. Co., Ltd.
 Kalkadoon Mine
 Kennedy Mine
 Klondyke Copper Mines, N. L.
 Lady Fanny Copper Synd., Ltd.
 Lord Lamington Mine
 McDonald Copper Mines, Ltd.
 Magpie Copper Mine
 Mammoth Copper Mine, Ltd.
 Many Peaks Copper M. Co., Ltd.
 Mount Babinda Mine
 Mount Cannindah Cop. Mines, Ltd.
 Mount Cardwell Mine
 Mount Cuthbert, N. L.
 Mount Elliott, Ltd.
 Mount Federal Mine
 Mount Flora Copper Co.
 Mount Glance Mine
 Mount Godkin Cons. C. Mines, N. L.
 Mount Gordon Copper Co.
 Mount Hector Copper Mines, Ltd.
 Mount Hope Copper Mines Co.
 Mount Molloy, N. L.
 Mount Morgan Extension Co., Ltd.
 Mount Morgan Gold Mg. Co., Ltd.
 Mount Orange Mng. Co.
 Mount Oxide Mine, Ltd. (N. S. W.)
 Mount Oxide Mines, Ltd.
 Mt. Warminster Lead & Cop. Mine, Ltd.

QUEENSLAND (Continued.)

Mungana Mining Co., Ltd.
 New Anniversary Mine
 New Cloncurry C. & S. Co., Ltd.
 New Einasleigh Copper Mines, Ltd.
 New Queensland Copper Co., Ltd.
 North Australian Expl., Ltd.
 North Duchess Copper Co.
 O. K. Copper Co., N. L.
 Ortona Mine
 Paisley Mine
 Percy River Syndicate.
 Queensland Copper Freeholds, Ltd.
 Queensland Expl. Co., Ltd.
 Robin Hood Mine
 Rogers Freehold Copper Mines, Ltd.
 St. Mungo Copper Mines, Ltd.
 Scottish N. Queensland Expl. Co., Ltd.
 Sellheim Silver & Copper Mines, Ltd.
 Silver Spur Mng. Co., N. L.
 Thorn's Find Mine
 Trafalgar Mine
 Trekelano Mines
 United Peak Downs C. & C. Co., Ltd.
 Vivian Mine
 Warroo G. & C. Mines, N. L.
 Willcock's Copper Mines, Ltd.
 Young Australian Mine

SOUTH AUSTRALIA

Appealinna Mine
 Balhannah Copper Mng. Co., Ltd.
 Belalie Copper Mng. Synd.
 Beltana Rapid Ore Treatment Synd.
 Benalack Copper Mine
 Benowrie Copper Mine, Ltd.
 Black Eagle Copper Mine
 Boulder Block Copper Mine
 Burra Burra Copper Mng. Co., N. L.
 Cockburn Hill Co., N. L.
 Copper Hill Mine
 Copper Queen Mine
 English & Australian Cop. Co., Ltd.
 Enterprise Copper Mng. Co., N. L.
 Franklin Copper & Lead Mng. Co.
 Hamley Mining Co.
 Kapunda Mines, N. L.
 Kanmantoo Copper Mines
 Langsford Mineral Claim
 Messina Primrose Copper Cor., Ltd.
 Montacute Gold & Copper Mng. Co.
 Mt. Gunson Proprietary M. Co., N. L.
 Mt. Lyell Consols Wallaroo Copper Mines, N. L.
 Mutooroo Cop. & Sil. Mng. Co., Ltd.
 Nackara Proprietary Copper Mng. Co., N. L.
 New Clara St. Dora M. Co., N. L.
 New West Mutooroo Cop. Mng. Co.
 Nilpena Copper Mng. Co., Ltd.
 Paramatta & Yelta Mines
 Port Lincoln Copper Co., Ltd.
 Spring Creek Mng. Co., N. L.
 Tumby Bay Copper Mng. Co., N. L.
 Union Cons. Cop. Mines (1911), Ltd.
 Wallaroo & Moonta Mng. & Sm. Co., Ltd.
 Walter's Copper Mine
 Warra Dividend Co., Ltd.
 Warra Warra Mine
 West Burra Copper Mine
 West Mutooroo Mine
 Yalpoondie Copper & Lead Mine
 Yelta Mine

TASMANIA

Alma Prospecting Syndicate
 Balfour Blocks Copper Mines, N. L.
 Balfour Cons. Copper Mines, N. L.
 Balfour Prospecting Ass'n.
 Burnie Mines
 Colebrook Prospecting Ass'n., N. L.
 Comstock Mine
 Copper Creek Mng. Co., Ltd.
 Darwin Prospecting Synd.

TASMANIA (Continued).

Derwent Prospecting Ass'n.
F. G. D. Copper Mng. Co.
Gippsland Copper, Platinum & Gold
Mng. Co.
Great Zeehan Dundas Silver Lead
Mng. Co.
Jukes Proprietary Mines
Lyell Consols Mines
Lyon's Balfour Copper Ass'n.
Mt. Balfour Cop. Mines, N. L. (No. 2)
Mt. Balfour Pioneers, N. L.
Mt. Balfour Pros. & Mng. Co., N. L.
Mt. Jasper Copper Mines, N. L.
Mt. Lyell Blocks Copper Mines
Mt. Lyell Comstock Copper Co., Ltd.
Mt. Lyell Mng. & Ry. Co., Ltd.
Murray's Reward Mine
North Balfour Copper Mines, Ltd.
North Lyell Mine
North Mt. Balfour Cop. Mines, N. L.
Rutherford Copper Mng. Co.
Scamander Copper Mines, N. L.
Strickland Mine
Tasman & Crown Lyell Extended
Mines, N. L.
Tasmanian Balfour Prospecting Assn.
Tasmanian Copper Co., Ltd.
Tasmanian Metals Extraction Co.
West Mt. Lyell, Ltd.
Zeehan-Dundas Mines, Ltd.

VICTORIA

Minerals Separation & De Bavay's
Processes, Aus. Prop., Ltd.
West Australian M. Co., Ltd.

WESTERN AUSTRALIA

British Explor'n, of Australasia, Ltd.
Copper Estates of W. Aus., Ltd.
Flag Gold & Copper Mng. Co., Ltd.
Fremantle Trading Co., Ltd.
Mons Cupri, Ltd.
Nor'-West Prospecting Co.
Phillips River G. & C. Co., Ltd.
Roebourne Copper & Gold Mines
Roebourne Copper Mines, Ltd.
Whim Well Copper Mines, Ltd.

New Zealand

Kawau Mine
Maoriland Copper Co., Ltd.
Tarawera Gold Mng. & Smelting Co

CENTRAL AMERICA.

HONDURAS

Antigua Gold-Copper Co.

PANAMA

Guacimo; Mina

EUROPE.

AUSTRIA

Brixlegg; K. K. Berg-Und Hutten-
verwaltung
Danube Mining Concession, Ltd.
Graslitzer Kupferbergbau
Kupferkiesbergbau Kupferplatte
Miedzianka Mine
Mitterberger Kupfer - Aktiengesell-
schaft
Predazza Oss Mazzurana, Kupfer-
gewerkschaft
Retia Mg., Power & Ry. Co., Ltd.
Witkowitz Bergbau und Eisenhütten
Gewerkschaft

BULGARIA

Belogradchic Exploration Synd., Ltd.
Economoff Mine (Se Kara Bair)
Kara Bair Mine
Plakalnitz Medna Planina
Widen Copper Syndicate, Ltd.

CORSICA

Francardo; Soc. d. Mines et Fond d.

CORSICA (Continued).

Prunelli (Corse); Soc. Anon. d. M.
d. C. de
Tama Mine

CYPRUS

New Lymni, Ltd.

FINLAND

Finnish-American Mining Co.
Ladoga Lake Mining & Smelting Co.
Outokumpu Copper Mine
Pitkäranta Kopperbruk

FRANCE

Ariege, Ltd., Societe Miniere de L'
Aveyron; Societe des Mines Metal-
iques de L'
Dives; Soc. Francaise D'Electro-
Metallurgie de
Fonderies et Laminiers; Soc. Anon.
des

GERMANY

Aktiengesellschaft z. Gewinn u.
Aufdereit v. Kupfererzen
Allgemeine Elektro - Metallurgische
Gesellschaft
Altwater; Gewerkschaft
Bergfrieden; Gewerkschaft
Bismarck; Kupfererz Gewerkschaft
Bodenmais; Kgl. Berg-und Hutten-
amt
Glausthal; Kgl. Huttenamt
Coriolan; Gewerkschaft
Dorothea; Gew. d. Bleiu, Kupfer-
erzbergwerke
Eiserner Union Gewerkschaft
Eisfelder Kupfergewerkschaft
Eliza; Kupfererzbergwerk
Elsie I.; Gewerkschaft
Gluckauf - Neviges; Gewerkschaft
Verein
Goldbach; Gewerkschaft
Herkules Frischgluck - Stolln und
Kiesels Hoffnung-Erb-Stolln
Himmelfahrt Fundgrube
Hohigsmund Hamburg; Gew.
Klingenthal-Glaslitzer Kupferberg-
bau; Gewerkschaft
Kupferberg; Gewerkschaft
Mansfeld'sche Kupferschieferbauende
Gewerkschaft
Munster'sche Gewerkschaft
Neu-Gluck; Grube
Norddeutsche Raffinerie
Oker: Verwaltung d. Kgl. Preuss &
Herzoglichen Braun-Schweigische
Kommun Hutten-Staatswerke
Otto Lucke Farb und Mineralwerk
Polarstern Gewerkschaft
Rammelsberg Mine
Richelsdorf I. Kupfererzbergwerk
St. Sylvester; Silberbergwerke
Schulz & W-hrenbold Justushutte
Schwarzwälder Erzbergwerke; Gew.
Stadtberger Hütte; Aktienges.
Thomas; Gew. d. Grube
Treupel; Bergwerk Fr. D.
Wilhelm; Kons. Erzbergwerk.

Great Britain

ENGLAND

African & Australian Co., Ltd.
African Ore Concentration Syn., Ltd.
African Oxide Syndicate
Boscawell United Tin & Copper
Mines, Ltd.
Botallack Limited
British Porphyry Copper Synd., Ltd.
Broughton Copper Co., Ltd.
Capper Pass & Sons, Ltd.
Carn Brea & Tincroft Mines, Ltd.
Cheshire Copper Mines, Ltd.
Cookson & Co., Ltd.
Craddock Moor Tin & C. Mines, Ltd.
Devon United Mines (1906), Ltd.

ENGLAND (Continued).

Dolcoath Mine, Ltd.
 Exploration Co., Ltd., The
 Geraldine Copper & Lead Mines, Ltd.
 Great Laxey, Ltd.
 Hafod Copper Works
 Herbert-Irvine Copper Mines, Ltd.
 Levant Mining Co., Ltd.
 Liverpool Silver & Copper Co., Ltd.
 London Venture Corporation, Ltd.
 McKechnie Bros.
 Metals Dev. Synd., Ltd.
 Minerals Separation, Ltd.
 Murex Magnetic Co., Ltd.
 New Alfred Mines, Ltd.
 Nicholson & Sons, Ltd., John
 Peruvian Dev. Synd., Ltd.
 Phoenix Mines (Cornwall), Ltd.
 St. Neot Mng. Synd., Ltd.
 Santa Cecilia Copper Mng. Co., Ltd.
 Seymour Copper Mng. Co., Ltd.
 Siberia Syndicate, Ltd.
 Snelston Copper Mine, Ltd.
 Tresavean Mines, Ltd.
 Treveddow Mining Co., Ltd.
 United African Explorations, Ltd.

IRELAND

Ardtully Copper Mines, Ltd.
 Beaupare Copper Mines (1909), Ltd.
 Bonmahon Cop. Mines Dv. Syn., Ltd.
 Coosheen Minerals, Ltd.
 Cronnebanne Mines
 Irish Mines Proprietary Co., Ltd.
 Knockmahon Mines
 Ovoca Copper Syndicate, Ltd.
 West British Dev. Syndicate, Ltd.
 West Carbery Copper Estates, Ltd.

SCOTLAND

Wm. Henderson & Co., Ltd.
 Kishorn Mine
 Otter Copper Co., Ltd.
 Shirvan Mg. Co., Ltd.

WALES

Britannia Copper Mine, Ltd.
 Dolgelly Copper Mine, Ltd.
 Loveden Mining Co. (1903), Ltd.
 Margam Copper Works
 Mining & Smelting Co., Ltd.
 Mona & Parys Mines, Ltd.
 Morfa Copper Works
 Nevill, Druce & Co.
 Penrallt Copper Mine
 St. David's Gold Mines (1903), Ltd.
 Talsarn Copper Mines, Ltd.
 Vivian & Sons
 Williams, Foster & Co. and Pascoe
 Grenfell & Sons, Ltd.

GREENLAND

Allongorssuak Mine
 Gronlandsk Minedrifts Aktieselskab

HUNGARY

Bailor; Soc. Anon. Mines de Cuivre
 de
 Danube Copper Mining Co., Ltd.
 Hongroise des Cuivres; Societe
 Hongroise des Mines; Compagnie

ITALY

Aprile; Societa Anon. per le Miniere
 Belge Pour la Recherche et L'Ex-
 ploration des Minerais; Soc. Anon.
 Bionaz; Societa Miniere di
 Boccheggiano Mine
 Calcante Mines
 Campiglia Estates, Ltd.
 Italiana; Sociedad Metallurgica
 Libiola; Soc. Anon. per L'Esercizio
 della Miniere di
 Libiola Copper Mining Co., Ltd.
 Ligure Ramifera; Societa
 Montecatini; Soc. Anon. della Mi-
 niere di
 Riparbella, Ltd.
 Valpellina; Soc. Miniere et Fonderie
 di

NORWAY

Allen; Soc. Anon. des Minés de
 Cuivre du
 Aamdal Mine
 Altens Kobbergruber
 Bandak Elektrolytiske Kobbervaerk
 Bede Metal & Chemical Co., Ltd.
 Birtavarre Kobbervaerk
 Bossmo; Soc. Anon. Pyrites de
 British Porphyry C. Syn., Ltd.
 Brustad Mines, Ltd.
 Christiania Nickel Refining Works
 Flaad Mine
 Foldal Copper & Sulphur Co., Ltd.
 Fosgrube Kobbergruber
 Holmholmen Copper Co., Ltd.
 Hovin Kobberminer; Aktieselskabet
 Killingdal Kobbervaerk
 Kirkeby Kobbergruber
 Kjoli Kobbergruber
 Kristiania Minekompani
 Kristianssands Nikkelraffinerings-
 verk
 Lyngenfjord Kobbervaerk
 Malsaa Copper Works
 Melkedalen, Ltd.
 Meraker Brug; Aktieselskabet
 Nedre Middavarre Kobbergruber
 Nordiska Grufaktiebolaget
 Norsk-Amerikanisk Kobbermine &
 Smelter; Aktieselskabet
 Norske Aktieselskap For Elektro-
 kemisk Industri
 Norwegian-American Copper Mining
 & Smelting Co.
 Norwegian Copper & General Mining
 Co., Ltd.
 Orkla Mine Co. (Grube-Aktiebolag)
 Plurdaalen Copper Mine
 Porska Kobberbruger; Aktiesel-
 skabet
 Ranen Copper Co., Ltd.
 Røros Kobbervaerk
 Røstvangen Gruber; Aktieselskabet
 Sam Eyde Co.
 Sjängeli Mines
 Squirrel Valley Copper Mine, Ltd.
 Sulitelma Aktiebolag
 Telemarken Copper Mining & Smelt-
 ing Co., Ltd.
 Thelma Syndicate, Ltd.
 Tinsjo Kobberminer; Aktieselskabet
 Tornerhjem Mine
 Traag Mines, Ltd.
 Undals Vaerks ny Interessentskab
 Venture Trust, Ltd.
 Ytteroen Mine

PORTUGAL

Alemtejana; Companhia Mineira
 Aljustrel; Soc. Anon. Belge des
 Mines D'
 Mason & Barry, Ltd.
 Murtega Minerals Co., Ltd.
 D'Orey; Waldemar
 San Domingos; Mina

RUSSIA

See ASIA for mines in Russian
 Turkestan and Siberia.
 Alverdski Mine
 Barana Copper Syndicate, Ltd.
 Bogoslovsk; Societe Miniere De
 Caucase; Soc. Indust. Et. Metallur-
 gique Du
 Caucasus Copper Co., Ltd.
 Caucasus Copper Industry Co.
 Chagali-Heliar; Soc. d'Indus. Min
 de
 Demidoff Copper Mines & Works
 Frolov (Sky) Mine
 Galizurski Works
 Gumeshevsk Mine
 Gurinsky Mine
 Kalatinsky Mines

RUSSIA (Continued).

Kargalinski Works
 Kedabeg M. & Red'n Works
 Kokand Copper Mines
 Koundourovy Freres; A. & G.
 Kyshtim Corporation, Ltd.
 Marnisson Copper Syndicate, Ltd.
 Meduorudiansk Mine
 Melik-Asarjanz Mine
 Mied Corporation
 Miednoroudiansk Mine
 New Districts Development Co., Ltd.
 Nijnj-Taglisk (Demidoff) Mines & Works
 Nikolajav Works
 Novaja-Zemlja M. Co.
 Pishminsko-Kluchevski Works
 Polieff-Syssert Smelter
 Rudianski Mines
 Siemens Copper Works
 Sissert Company, Ltd.
 South Urals M., M. & S. Co.
 Sunik Mines
 Tanalyk Corporation, Ltd.
 Ugurchaiska Mine
 Verch-Issetsky Works
 Verch-Kyshtim Works
 Verchoturiski Works
 Vlijski Works

SERVIA

Bor; Compagnie Francaise des Mines de
 Danube Mining Concession, Ltd.
 Maidenpek; Soc. Anon. des Mines de Cuivre de
 Valievo (Serbie) Soc. Anon. Francaise des Mines de Cuivre de

SPAIN

Almanzora; Sociedad Minera de Andrea; Societé des Mines de Cuivre
 Aragon Copper Mines, Ltd.
 Aramo Copper Mines, Ltd.
 Badajoz Copper Mines, Ltd.
 Bede Metal & Chemical Co., Ltd.
 Bilbaina Asturiana; Cia. Minera
 Buitron; Cia. del Ferrocarril y Minas del
 Cabezas del Pasto; Minas
 Cala; Sociedad Anonima Minas de Campanario; Societé des Mines de Cuivre de
 Caridad Copper Mining Co., Ltd.
 Carrena Copper Mines, Ltd.
 Castillo del Buitron; Mina
 Castillo de las Guardas; Soc. Espanola Mines del
 Catalana-Valenciana; Soc. Minera Commercial Corporation, Ltd.
 Cordoba Copper Co., Ltd.
 Escorial Copper Mines, Ltd.
 Esperanza Cop. & Sulphur Co., Ltd.
 Estrella; Societé Anonyme la Ferrocobrizas; Compania de Minas Ferrol; Soc. Anon. des Mines de Cuivre du
 Gaditana de Minas; Compania Herrerias; Mina las
 Hueca Mine
 Huelva Cop. & Sulphur Mines, Ltd.
 Huelva; Soc. Franc. des Pyrites de Joya Mina; La
 Julia Copper Mng. Syndicate, Ltd.
 Lapilla Mine
 Lealtad Copper Mine Co.
 Monte Rubio Mines
 Murcia Copper & Iron Mines, Ltd.
 Nerva S. A., Minas de Cobre de B. Newgass & Co., Ltd.
 Nuestra Senora de la Salud; Sociedad Minera
 Oriente de Tharsis Mine
 Peña Copper Mines, Ltd.
 Peñuelas; Sociedad Anonima de

SPAIN (Continued).

Rica Mina; Sociedad Minera la (Bajo Rio Tinto)
 Rio Fardes; Soc. Anon. des Mines de Cuivre et de Plomb, Argent. du Rio Murtiga; Societé des Mines du Rio Tinto Co., Ltd.
 Romanera Copper Co., Ltd.
 Ruesga; Soc. Anonima Cobres de St. Gobain Channy et Arey; Soc. de San Miguel Copper Mines, Ltd.
 San Pedro; Soc. Anon. d. M. de San Platon; Cia. d. M. d. Cuivres de
 Seville Sulphur & Copper Co., Ltd.
 Sierra Co., Ltd.
 Sierra Morena Copper Mines, Ltd.
 Spanish Copper Co., Ltd.
 Sundheim; Soc. Col. C. y J.
 Tharsis Sulphur & Copper Co., Ltd.
 Tinto v Santa Rosa; Soc. d. I. M. d. Cobre
 Tolosa; Soc. Anon. M. Met. de United Alkali Co., Ltd.
 Valenciano-Andaluza de Alto Hornos y Minas de
 Peñafior; Soc.
 Zalamea Copper Co., Ltd.

SWEDEN

Atvidabergs Kopparverk; Aktiebolaget
 Duluth-Husa Copper Mines Co.
 Falun Mines
 Helsingborg's Koppverk Aktiebolaget
 Husa; Aktiebolaget Grufvor
 Kafveltorps Kopparverk
 Lake Copper Proprietary Co., Ltd.
 Lake Copper Syndicate; Aktiebolag Nautenens Kopparfält; Aktiebolaget Naversberg Falun Copper Mines & Works, Ltd.
 North Copper Co., Ltd.
 Sjangeli Mines
 Swedish Metals Extraction Co., Ltd.

TURKEY

Arghana Maaden Mines
 Balkan Copper Corporation, Ltd.

OCEANICA

BORNEO

British Borneo Exploration Co., Ltd.

FIJI ISLANDS

Fiji Copper Co.

NEW CALEDONIA

Balade Mine
 Edison Mine
 Pilon Mine

PAPUA

Astrolabe Mining Syndicate
 Baldwin Mine
 Laloki Copper Mine

SOUTH AMERICA.

ARGENTINA

Bausch y Tiani; Soc. Minera y Fundicion de
 Buerrero de Valle Hermoso; Cia. Minera
 Capillitas Consolidated Mines, Ltd.
 Famatina Co., Ltd.
 Famatina Dev. Corporation, Ltd.
 Forastera Mines, Ltd.
 International Copper Co., Ltd.
 Mining Exploration Co.
 New Districts Development Co., Ltd.
 Nonogasta; Soc. Francesca de Minas Fundicion de
 Rosario; Cia. Minera

BOLIVIA

Alexander y Cia.
 Aramayo Francke Mines, Ltd.

BOLIVIA (Continued).

Bates; John
 Berthin; Angel
 Berthin; Noel
 Bolivia; Compania Cuprifera de
 Bruce & Chessor Mining Co.
 Bruger y Ca
 Cintilla Copper Mining Co., Ltd.
 Cobrizas Mina
 Corocoro de Bolivia; Compania
 Corocoro United Copper Mines, Ltd.
 Esperanza Francesca
 Golondrinas; Mina de
 Guernica Silver & Copper Mines
 (Bolivia), Ltd.
 Huanchaca de Bolivia; Compania
 Los Angeles; Compania Minera
 Manuel Calderon (see Cald. Man.)
 Marquieaul; Angel
 Rosa Herminia
 Terremoto Mine

BRAZIL

Carahyba; Minas de Cobre de
 Cerro do Garaldo; Mina
 Cerro Martino; Mina
 Seibal; Soc. Anon. des Mines de
 Cuivre de

CHILE

Alicahue; Fundicion de
 Almendral; Soc. Min. el
 Altamira Mine
 Andacollo; Cia. Min. des
 Anglo-Chilena de Collahuasi; Cia.
 Armonia; Cia. la Mina
 Atacama; Soc. Industrial de
 Aurelia Mine
 Barazarte; Sucesion de
 Basillio Caceres
 Bio-Bio (Chile) Cop. Synd., Ltd.
 Blanca Torre de Collahuasi; Cia.
 Minera
 Bodelon i Cia.; Felipe
 Braden Copper Co.
 Braden Copper Mines Co.
 Bronces; Cia. Esplotadora los
 Bronces; Soc. Minera de los
 Cabillo; Fundicion de
 Caceres; Basillio (see Bas. Cac.)
 Calama; Cia. de Minas i Fund. de
 Carmen; Minas del
 Carmona; Guillermo
 Carrizal Share Trust, Ltd.
 Carrizal; Soc. de Minas y Fund. de
 Carrizalillo; Minas de Cobres de
 Carvallo; Guillermo
 Castellanos y Cia.
 Catemou; Soc. des Mines de Cui. de
 Central Chili Copper Co., Ltd.
 Central de Collahuasi; Soc. Minera.
 Cerro Blanco; Cia. Esplotadora de
 Minas de
 Cerro de la Gloria; Cia. Minera
 Cervero; Sucesion
 Chanaral; Cia. Exploradora de
 Chanaral; Soc. des Mines et Usines
 de Cuivre de
 Chanarcitos; Fundicion de
 Chile Copper Co.
 Chile Exploration Co.
 Chilena de Fundiciones; Sociedad
 Choquelimpe; Soc. Empresa Min. y
 de Fun. del Min. de
 Chorillos Smelter
 Chuquicamata; Soc. Esplotadora de
 Combarbala; Cia. Minera de
 Compania de Minas de Cobre de
 Gatico
 Concordia de Collahuasi; Cia. Min.
 Condoriaco; Cia. Minera de
 Copper Mines of Copiapo, Ltd.
 Cutter Cove; Soc. de Minas de Co-
 bre de
 Defenso y Todos Santos; Soc. Min.

CHILE (Continued).

Descubridora Mine
 Durazno Smelter
 Echavarria; Guillermo
 Elgue; Agosto
 Espinoza; Jose Ramon
 Farellon de Tongoy; Soc. Minera
 Flor del Boquette; Mina
 Francaise des Mines de Cuivre; Soc.
 Fronton; Mina
 Gatico; Cia. de Minas de Cobre de
 Geisse; Sucesion Francisco
 Geisse; Hermanos
 Gloria del Inca; Cia. Minera
 Gonzalez; Sucesion P.
 Guayacan Smelter
 Guillermo Carvallo (see Car. Guil.)
 Harnecker; Otto
 Higuera; Fundicion de la
 Hilda Mine
 Huantajaya; Soc. Intern'l Min. i
 Beneficiadora de
 Hueso; Fundicion el
 Illapel Smelter
 Ilusion; Mina la
 Inca; de Oro i Cobre de Copiapo;
 Cia. Minera
 Incenso; Mina el
 Iniguez; Carlos Vergara
 Jose Bruno Gonzalez Julio
 Lambert; Sucesion C. J.
 Larraguibel; Jose
 Laura de Huantajaya; Cia. Minera
 Lavinia de Huantajaya; Soc. Minera
 Llaillai Smelter
 Lobrar Smelter (Fund. de Lobrar)
 Lota i Coronel; Nueva Soc. Com. de
 Magallanes; Soc. Esp. de Minas de
 Maipo; Cia. Minera de
 Maitenes; Fundicion de
 Maldini de Collahuasi; Soc.
 Marambio; Tomas
 Mena; Lorenzo
 Minnie Mine
 Morado; Soc. Esplotadora del
 Naltagua; Soc. des Minas de Cui. de
 Nuevo Porvenir Smelter
 Ocana; Camilo
 Orito; Cia. de Minas el
 Osorio i Ca; Enrique
 Paipote Smelter (Fund. de Paipote)
 Palqui; Cia. Minera el
 Panulcillo & Condensa Copper Mines
 & Smelting Works
 Perez; Francisco de Paula
 Phoenix Mining Co.
 Poderosa de Chuquicamata; Cia.
 Minera
 Poderosa Mining Co., Ltd.
 Porvenir Smelter
 Puquios; Cia. Minera de
 Quilomenco Smelter
 Ramadillas Smelter
 Ramos i Ramos; Jose Tomas
 Ribillo; Juan de C.
 Rojas; Rafael
 Rosario; Mina
 Rosario i Providencia; Minas
 Saavedra i Besa
 San Agustin; Mina
 San Bartolo; Soc. Minera
 San Juan; Soc. Minera
 San Ramon de Freirina; Cia. Minera
 Santa Rita de Arqueros; Soc. Min.
 Serena; Soc. Minera de la
 Societé Francaise des Mines de Cui.
 Tacna; Soc. Beneficiadora de Met-
 ales de
 Tagle; Sucesion Ruiz
 Tamaya; Soc. Anon. del Mineral de
 Tambillos Smelt. & Mng. Syndicate
 Tarapaca de Collahuasi; Cia. Min.
 Tarapaca Copper Quarries, Ltd.

CHILE (Continued).

Tarapaquena de Chanaral; Cia.
 Teniente Smelter
 Tierra Amarilla Smelter
 Tocopilla; Soc. Beneficiadora de
 Tolar de Collahuasi; Sin. Minero el
 Ureta é Hijos; Ignacio Silva
 Valdevia; Fundición de
 Vicuna; Felix
 Vicuna; Santiago
 Vladivostok de Collahuasi. Cia.
 Minera
 Volcan Smelter
 Zelaya Hermanos

COLOMBIA

Zancudo; Cia. Minera de

PERU

Ackermann; C. F.
 Andina; Soc. Benef. de Minerales
 Azalia; Nicolas
 Backus & Johnston Co.
 Bentin; Ricardo
 Canza Mine
 Carmen; Cia. Minera del
 Casapalca Smelter
 Caylloma; Soc. Esplotadora de
 Cerro de Pasco Copper Co.
 Cerro de Pasco; Cia. Emp. Soc. del
 Cerro de Pasco Investment Co.
 Cerro de Pasco Mining Co.
 Devonshire Syndicate
 Diaz; G'Ruiz
 Fernandini; Eulogio E.
 Ferrobarba, Ltd.
 Gallo Hermanos
 Gertrudis Mine
 Guillermo Grundy
 Huachumachay; Soc. Minera
 Huaron; Soc. Cuivre de
 Huilca; Soc. Minera la
 Huinac Consolidated Copper, Ltd.
 Huinac Copper Mines, Ltd.
 Inca Copper Syndicate

PERU (Continued).

Incaoro Mining Co., Ltd.
 Lampa Mining Co., Ltd.
 Lohmann; Carlos
 Miculicich y Valentine
 Morococha Mining Co.
 Natividad; Soc. Minera
 Nueva Australia Mine
 Peru Mines & Estates, Ltd.
 Peruvian Mng., Sm. & Refining Co.
 Proano; Lizandro A.
 Rio Blanco Smelter.
 Rio Tambo, Ltd.
 Santa Barbara; Cia. Ind. y Min. de
 Santa Ines Mining Co., Ltd.
 Santa Ines y Morococha; Cia.
 Sayapullo; Cia. Minera
 Tamboraque; Fundición de
 Tucu-Cheira; Soc. des Mines de
 VENEZUELA
 Ayacucho Copper Syndicate, Ltd.
 Quebrada; Minas la
 Seboruco Mines
 South American Copper Syndicate.

WEST INDIES

CUBA

(Companies are described in Part 1
 American section.)

Cuba Copper Co.
 Los Cerros Copper Co.

HAYTI

Blanton Copper Mng. Syn.
 Terre Neuve Mng. Co.

JAMAICA

Jamaica Consolidated Copper Co.

PORTO RICO

Abundancia; Mina La (see p. 10,
 U. S.)

SANTO DOMINGO

Blanton Copper Mng. Syn.
 San Cristobal Mng. Co.

PART III.

COPPER MINES OF FOREIGN COUNTRIES.

AALEN; SOCIÉTÉ ANONYME DES MINES

DE CUIVRE DU.

NORWAY

Office: care Theodore Verstraete, Gand, Belgium. Mine office: Engsvold, Aalen, Trondhjem, Norway. Nøerk Olsen, supt. and engr., at last accounts. Capitalization 200,000 kroner. Property includes the Størhogd grube, carrying cupriferous pyrite, at Aalen, and the Sjöla grube, at Klaebu. Production, about 287 metric tons cupriferous pyrite annually. Presumably idle.

AAMDAL MINE.

NORWAY

Owned by Bandak Elektrolytiske Kobbervaerk.

ABUNDANCIA MINA.

PORTO RICO

See same title Part I.

ACE MINE.

NEW SOUTH WALES

Idle. Mine near Beaconsfield, Kennedy Co., N. S. W., Australia. A. H. Dight, owner, at last accounts. Property shows outcrops of iron gossan estimated to carry 1 to 2.5% copper, traceable for about 1,000'. Underlying the gossan there is 3 to 6' of vein stuff, developed by a 231' main shaft, on the underlay, with levels opened at 170', 220' and 270', the vein at the bottom of the mine being only 18" wide, with a pay streak of 6 to 8", remainder of vein being cupriferous pyrite, estimated to carry 1.5% copper. There are oxide and carbonate ores and gray copper ore on the 170' level, with native copper and secondary sulphides on the 220' level, and chalcocite and chalcopyrite in the pay streak on the 270' level, good ores being estimated to carry an average of about 15 dwts. silver per ton, with a trace of gold. Management planned building a smelter when sufficient ore was developed.

ACHAICHES; SOCIÉTÉ ANONYME DES MINES

DE CUIVRES DE.

ALGERIA

In liquidation. Albert Warin, 24 Cité Trévise, Paris, France, liquidator. Formerly at Achaiches, near El Milia, Constantine, Algeria. Described Vol. X.

ACKERMANN, C. F.

PERU

Mine address: Islay, Camaná, Arequipa, Peru. Property is La Victoria mine, situated on the railroad line, near Mollendo, showing ore of 6 to 10% average copper tenor, with some gold values, in quartz gangue. Presumably idle.

ADAKAI MINE.

JAPAN

Idle. Mine office: Adakai-mura, Yatsuka-gori, Izumo, Japan. Country rocks are Tertiary shale and sandstone, alternating. Principal vein strikes

north-northeast. Ores are bornite, chalcopyrite and pyrrhotite, accompanied by native copper and sphalerite, with clay gouge. No returns secured.

AFRICAN & AUSTRALIAN CO., LTD.

ENGLAND

Secretary and office: A. H. Foster, 6 Great St. Helens, London, E. C., England. J. B. Palmer, chairman; E. A. Foster and E. Pope, directors. Organized April, 1902, as the third reconstruction of the West Australian Mining Co., Ltd., originally Victoria Copper Co. Capitalization £120,000, shares 2s. par; issued 201,718, fully paid. Company formerly held interests in copper mines.

AFRICAN ORE CONCENTRATION SYNDICATE, LTD. ENGLAND

Secretary and office: J. A. Stocker, 4 Broad St. Place, London, E. C., England. A. S. Elmore, T. J. Milner and C. Pakeman, directors. Organized June, 1905, capitalization £12,000, shares £1 par, issued and fully paid. Company has patents for the treatment and concentration of ores and has erected plants at the Transvaal Consolidated Land & Exploration Co. and Namaqua Copper Co.'s properties in South Africa.

AFRICAN OXIDE SYNDICATE.

ENGLAND

In liquidation. J. A. Stocker, 4 Broad St. Place, London, E. C., England, liquidator. Company organized, 1910, to treat copper and other ores by patented process.

AÏN-BARBAR; COMPAGNIE DES MINES D'.

ALGERIA

Office: 10 Rue Rochambeau, Paris, IXe, France. Mine office: Bône, Constantine, Algeria. A. Mérendet, pres.; M. A. DeBilly, administrateur-délégué; preceding officers, M. Baraige, Edmond Bure and Abel Jacquet, directors; Désiré Morda, gen. mgr., at last accounts. Company is a dividend payer.

The company's lands, 22 kilometers northwest of Bône, are on the coast, but there is no nearer harbor for steamers of more than 100 tons, though small vessels can land at a jetty, in favorable weather.

The mine, discovered 1864, and sold, 1874, to an English company, was developed extensively, but owing to the complex nature of the ore and the low price of copper, the company was unsuccessful. The mine was then returned to the Vieille Montaigne Co. and worked for zinc, afterward being taken in hand, 1890, by the present company. Property shows several veins carrying complex sulphides, mainly chalcopyrite, associated with considerable quantities of sphalerite, galena and pyrite. The Abaid orebody has a known length of 600 meters, and there also is another important orebody known as the Playfait. Mine has ore reserves developed for 3 to 4 years' production.

Equipment includes a 360-h. p. electric plant, at the mine, which is expensive in operation, owing to cost of transportation of fuel from Bône.

The mill, of about 100 metric tons daily capacity, includes a magnetic separation plant, which at last report had an annual production of 333 metric tons of copper concentrates and 367 metric tons of zinc concentrates. Company has experimented with various metallurgical processes for more satisfactory separation of the mixed sulphides, but property is on a profitable basis, notwithstanding the difficult nature of its ore. Company is said to plan reducing ores at a prospective smelter, to be built near Marseilles.

Production was 31,351 metric tons of raw ore, giving 7,545 metric tons of washed copper ore and 1,800 tons of washed mixed ore, yielding, after calcining and magnetic separation, 710 tons copper ore and 649 tons sphalerite, former estimated to contain 225,000 lbs. fine copper, for last year reported. For 1907 production included 82 metric tons of chalcopyrite concentrates and 7,705 metric tons of mixed copper, zinc and lead sulphides.

secured from a mine product of 33,058 metric tons, with copper production estimated at 250,000 lbs.

AKANUMADA MINE.

JAPAN

Mine office: Azu-mura, Naka-gori, Kii, Japan. Production, about 700,000 lbs. copper ore annually.

AKAYAMA MINE.

JAPAN

Mine office: Honjo-mura, Minami-Murayama-gori, Uzen, Japan. Production, last reported, was 9,915 lbs. fine copper, and 1,668,430 lbs. copper ore, 1907. Idle.

**AKTIEN-GESELLSCHAFT ZUR GEWINNUNG UND
AUFBEREITUNG VON KUPFERERZEN.**

GERMANY

Idle. Mine near Siebenbürgen, Brandenburg, Prussia, Germany. Jacob Klausner, Ephraim Fritz Klausner, A. Zwack, Alb. Bruck and Martin Kondor, directors. No report, 1913. Organized under laws of Germany, capitalization 80,000 marks, the directors taking the entire capital stock. Properties, in the vicinity of Siebenbürgen, are in the prospect stage.

AKUTOZAWA MINE.

JAPAN

Idle. Mine office: Yokokawame-mura, Waka-gori, Rikuchu, Japan. Property, in the district of Iwate, produced 91,869 lbs. fine copper in 1907.

ALDERSHOT SMELTER.

QUEENSLAND

Idle many years. Works office: Aldershot, Cook Co., Queensland, Australia. Was owned by Queensland Smelting Co., Ltd., but possession was taken, April, 1908, by debenture holders under a mortgage of £43,800. Lands, 1,168 acres, freehold. Smelter has lead and copper stacks.

ALEMTEJANA; COMPANHIA MINEIRA.

PORTUGAL

Office: 4 Praca Duque da Terceiro, Lisbon, Portugal. Mine office: Beja, Alemtejo, Portugal. Waldemar d'Orey, managing director. Property is a group of old mines in the San Domingos district, carrying 2 orebodies in schists, ore being mainly chalcopryrite, with a small quantity of carbonates. Mine, known as the Ruy Gomes, was worked by the Romans. Development includes 4 old shafts, of 20 to 30 meters depth, with 7 levels opened and about 90 meters of drifts. No recent returns secured.

ALEXANDER y CIA.

BOLIVIA

Office and mine: Coro Coro, La Paz, Bolivia. The firm was a small producer of native copper at last accounts.

ALGÉRIE; COMPAGNIE INDUSTRIELLE

ET MINIERE DES CUIVRES D'.

ALGERIA

Office: 35 Rue Joubert, Paris, France. Mine office: Ain-Sefra, Oran, Algeria. Baron de Bondeli, chairman. Organized Sept. 11, 1902, under laws of France, capitalization f 1,000,000, shares f 500 par. Owns the Hendjir mine, 3,800 hectares, 8 miles from Ain-Sefra, with cupriferous sandstone beds of several hundred feet thickness, that carry disseminations of gray copper ore, said to assay 2 to 2.5% copper. Mine is opened to depth of about 100 meters. Beds average too low in copper for profitable mining and company has had to rely on local enrichments of ore of payable grade. Idle, but deposit will be tested for tonnage now that ore can be profitably handled by froth flotation.

ALICAHUE; FUNDICIÓN DE.

CHILE

Owned by Ignacio Silva Ureba c Hijos, at La Legua, Aconcagua, Chile.

ALJUSTREL (PORTUGAL); SOCIÉTÉ ANONYME BELGE

DES MINES D'.

PORTUGAL

Office: 95 Avenue des Arts, Antwerp, Belgium. Mine office: Algarez, Aljustrel, Alemtejo, Portugal. Comte de Ramaix, chairman; Alfred Eyben, managing director; Libert Eyben, sec.; preceding officers, Fred. Jacobs and Francisco da Silveira Vianna, directors; Victorin Valpelière, gen. mgr.; F.

d'Oliveira, chemist-assayer. Organized April 1, 1898, under laws of Belgium, capitalization 7,200,000 francs, 500 francs par, fully paid. Debentures, 1,000,000 francs authorized, at 5%; issued, 277,000 francs. Dividends, to end 1910, were 81 francs, 75 centimes. Annual meeting, third Monday in April. Employs 1,600 men.

Lands, 5 claims, 3,500 hectares, carrying 6 veins of cupriferous pyrite, in schist, under development, estimated by company to average 1.85 to 2% copper, 0.6% lead and 0.2% zinc. Mine, opened by 6 shafts to depths ranging from 60 meters to 120 meters, has over 1,500,000 tons ore in sight, of which fully 250,000 tons is blocked out for stoping.

Equipment includes 7 hoists good for a depth of 800', 2 Flotmann air compressors with capacity for 40 drills, machine shop, smithy, carpenter shop and about 180 other buildings; and a narrow-gauge railway 12.6 miles long, known as the Ferrocarril Aljustrel, equipped with 8 locomotives and 300 cars, connecting with the government railway.

Production, 1912, was 3,637,530 lbs. fine copper and total copper produced by company to end of that year was nearly 40,000,000 lbs. Production, 1913, is estimated by company at about 4,000,000 lbs. fine copper, secured at a cost of about 10 cts. per pound.

ALLGEMEINE ELEKTRO-METALLURGISCHE GES. GERMANY

Works office: Papenburg a/d Ems, Hanover, Germany. Property is a small electrolytic refining plant, with capacity of about 500 lbs. of cathodes daily, treating nickel-copper anodes.

ALLONGORSSUAK MINE. GREENLAND

Owned by Grönlandsk Minedrifts Aktieselskab, at Juliänsaab, Greenland.

ALMA PROSPECTING SYNDICATE. TASMANIA

Mine office: Forth, Devon Co., Tasmania. Lands, about 10 miles from the seacoast, on the north shore of Tasmania, above Wilmot bridge and west of the Forth river, include the old Barrington or Alma mine, opened 1881, at which time about £1,000 was expended, the mine producing a little chalcopryite. The property shows slate and breccia of Cambrian age. Development is by tunnels of 60' and 281', the latter with 2 short crosscuts, showing a little native copper in jointing planes, but mainly chalcopryite with gangue of barite. There also is a 35' shaft. Was idle in 1912.

ALMANZORA; SOCIEDAD MINERA DE. SPAIN

Office and mine: Javier Sanz 4, Almería, Spain. D. Camilo Bilarge, agent, at last accounts. Property includes several small old copper mines, slightly developed, near Almería. Idle many years and presumably moribund.

ALMENDRAL; SOCIEDAD MINERA EL. CHILE

Office: Coquimbo, Chile. Mine office: San Felipe, Chile. Luis Amenábar, manager. Organized Jan. 5, 1906, under laws of Chile, capitalization 1,000,000 pesos, shares 50 pesos par. Property is a lixiviation plant, reported to treat 2% copper ore, securing 60% precipitate. Production, 1907, was 49,780 lbs. fine copper.

ALPHA COPPER MINING CO., N. L. NEW SOUTH WALES

Mine office: Cobar, Robinson Co., N. S. W., Australia. Organized 1907, capitalization £1,000, shares £1 par. No trace of mining operations, secured. Idle and presumably dead.

ALTAMIRA MINE. CHILE

Idle. Mine office: San Lorenzo, Combarbalá, Coquimbo, Chile. Jerónimo Tapia, owner and mgr. Mine, 18 leagues from a railroad station, with 20 pesos freight charges per metric ton, shows a vein of about 1 meter

average width, developed to depth of 260 meters. Was a small producer of copper.

ALTENS KOBBERGRUBER.

NORWAY

Idle. Office: care of Sulitelma Aktiebolag, Helsingborg, Sweden. Mine office: Kåfjord, Finnmarken, Tromsø, Norway. Lord-Lieutenant G. Tornerhjelm, chairman; Consul N. Persson, vice-chairman; C. Ingelsson, sec. Lands, 339 claims, also a 60-acre mill site and 2,000 acres miscellaneous lands. This is the northernmost copper mine in the world, lying near North Cape, in 70° north latitude. Post-silurian schists and slates have been penetrated by dioritic greenstone, showing about 75 orebodies in diorite and also as impregnations in dolomitic strata. The veins have a generally north-northwest strike, fissures in diorite dipping at about 30° and dolomitic layers at about 60°. About 20 strong veins and many small ones are under development, former ranging 1 to 3 meters in average width, and traceable 50 to 2,000 meters. The various veins average about 1.25% copper, ores occurring as chalcocite, bornite and chalcopyrite, disseminated in pyrite.

Development is by numerous tunnels, of which the Sture is 650 meters and the Jernmalm 415 meters in length, and by 6 shafts, deepest 100 meters. The mine has several miles of workings, exposing fully 600,000 tons of ore, with 100,000 tons blocked out for stoping. Mine, opened 1825 and closed 1878, was reopened, 1895, by present owner.

Equipment includes 120 hydraulic h. p., 100 electric h. p., 25 steam h. p., and 15 gasoline h. p. There are 4 small hoists, 2 Sullivan diamond drills and an electric light plant. Buildings include a machine shop of 220 square meters area, a 40-meter carpenter shop and 170 buildings of all classes, including dwellings.

The 100-ton concentrator, of 1,716 square meters area, has 2 Blake crushers, 4 Humboldt centrifugal crushers, 2 rolls, 11 jigs, 16 Långbörg vanners and 4 large and 8 small spitzkasten. The smelter has a 20-ton water-jacket blast furnace, smelting to a 20% matte, which, by a second fusion, is brought up to 60% copper tenor, and shipped to Helsingborg for refining.

The mine is 300 miles from a railroad, but only 300 ft. from the sea. The company owns a steamer and a gasoline launch. A school is maintained. Production, 1907, was 25,000 metric tons of ore yielding 1,050 tons of matte and 600 tons of 48% sulphur ore, producing 625,000 lbs. fine copper.

ALTVATER; GEWERKSCHAFT.

GERMANY

Idle. Mine office: Altwaltnau, Hirschberg-Grosselmerode, Hesse-Nassau, Germany. Herr Springorum and Herr Bellwinckel, executive committee; Carl Reichel, agent; Herr Müller, supt. Property has copper and lead ores, developed by 1 shaft.

ALVERDSKI MINE.

RUSSIA

Formerly owned by Compagnie Française des Mines de Cuivre d'Akhtala, at Alverdschi, Tiflis, Russia. Now dead.

AMALGAMATED PROPERTIES OF RHODESIA, LTD. RHODESIA

Office: 277 Salisbury House, London, E. C., England. Mine office: Lomagunda, Mashonaland, Rhodesia. G. R. Bonnard, chairman and managing director; preceding officer, A. Dickinson, A. Joll and T. H. Vernon, directors; G. T. Frost, sec.; Sidney C. Dyer, cons. engr. Organized May 8, 1909, under laws of Great Britain, capitalization £750,000, shares 5s. par, fully paid; increased March, 1911, to £1,500,000; issued, 3,909,954 shares. Company absorbed the Lomagunda Development Co., West Rhodesia Banket Co., Gold Fields of Matabeleland, Ltd., Rhodesia Matabeleland Development Co., Bulawayo Estate & Trust Co., Napier & Wier, Ltd.,

Gwanda Railway Syndicate, Ltd., Clark's, Consolidated, Ltd., Constance Rhodesia Development Co., Transvaal & Rhodesia Farms & Mines, Ltd., and also took over certain properties from the British & Colonial Investments, Ltd., Rhodesian Mining & Finance Co., C. Acton Dodds and other companies and individuals.

Lands are 1,244,380 acres and 2,518 mining claims in Rhodesia, 32,242 acres of land and 1,037 deep-level claims and an 87½% interest in 144 claims in the Transvaal, and various other interests. The property taken over from the Lomagunda Development Co. was 316 claims in the Lomagunda district of Mashonaland, including the United Kingdom claim on which limited development showed a promising body of copper ore.

AMALGAMATED VICTORY COPPER MINING

CO., LTD.

QUEENSLAND

Office: Townsville, Queensland, Australia. Mine office: Cloncurry, Beaconsfield Co., Queensland, Australia. Company is capitalized at £15,000, shares 10s. par, paid in 9s. per share; issued, 14,755 shares.

Mine has a 5' vein developed by a shaft 312' deep, and had about 100' of openings on the 90' level Jan., 1912. The vein at this depth is narrow and of little value, the ore exposed being mostly iron.

ANDACOLLO; COMPAÑIA MINERA DE.

CHILE

Office: Santiago de Chile. Mine office: Andacollo, Coquimbo, Chile. Organized July 4, 1906, under laws of Chile, capitalization 1,125,000 pesos, shares 15 pesos par.

Lands include La Hermosa and Las Cuevas mines, area 29 hectares, also mineral lands at Tambillos. Mines are wet, showing considerable quantities of 5 to 6% sulphide ore, with ferruginous gangue. Property has extensive old dumps.

A leaching plant, built 1907, treats the mine water, which carries less than 100 grams of copper per cubic meter, and also is leaching old ore from the dumps, with sulphuric acid. Equipment includes a central electric power plant, with a 75-h. p. gas engine and producer gas plant.

ANDINA; SOCIEDAD BENEFICIADORA DE MINERALES.

PERU

Mine office: Chico, Yauli, Junín, Peru. Has argentiferous copper ores. Idle and apparently dead.

ANDREA; SOCIÉTÉ DES MINES DE CUIVRE.

SPAIN

Office: Brussels, Belgium. Mine office: Andrea, Badajoz, Spain. Organized Sept. 27, 1907, under laws of Belgium, capitalization f 1,000,000, in 10,000 shares of f 100 par, and 10,000 shares without assigned value. Lands include the Andrea, Esperanza and Neustra Señora del Carmen mines, in the district of Llorenña. Development work was in progress at last accounts.

ANGLO-CHILENA DE COLLAHUASI; COMPAÑIA.

CHILE

Office: Valparaíso, Chile. Mine office: Collahuasi, Calama, Antofagasta, Chile. Organized May 17, 1906, under laws of Chile, capitalization £200,000, shares £1 par. Property is the Mina Emilia, partially developed, having steam power. In 1913 was exporting 70 metric tons monthly of 20% copper ore.

ANGLO-GERMAN TERRITORIES, LTD.

CAPE PROVINCE

Office: 15 Eldon St. House, London, E. C., England. Organized 1907, capitalization £300,000, shares £1 par. Property consists of several concessions, that in Little Namaqualand having an area of about 1,300 square miles; the one in German South-West Africa of 2,000 square miles, 1,200 square miles being freehold and 800 square miles leasehold, possessing a frontage of 100 miles on the Orange river, this property being subject to a contract held by another company giving the right to select certain lands

in this area. The property in Little Namaqualand is 60 miles from Port Nolloth, with which it is connected by railroad.

The estate shows numerous indications of copper, gold, silver and galena, and is well timbered.

ANI MINE.

Owned by Furukawa Mining Co.

JAPAN

ANNIVERSARY COPPER MINES, LTD.

QUEENSLAND

Office: Townsville, Queensland, Australia. Mine office: Herberton, Cardwell Co., Queensland, Australia. J. M. Hollway, pres.; H. S. Muir, mine mgr. Organized April, 1909, under laws of Queensland, as successor of New Anniversary Copper Prospecting Syndicate, Ltd., capitalization £40,000, shares £1 par; fully issued, in £15,000 full-paid and £25,000 part-paid stock; paid in, 12s. per share. Of the fully paid shares, £12,500 went to vendors and £2,500 for flotation expenses. The New Anniversary paid, 1907, a small dividend.

Lands, 17 claims, leasehold, developed by tunnel and shafts, with shallow workings. The 391' tunnel, planned to be continued to the western boundary, shows a 3' vein of copper ore. The Engine shaft, to be connected with the tunnel, shows a 2' vein of 10% ore at bottom, and a drift therefrom shows a 30" vein giving average assays of 13% copper and 9 oz. silver per long ton. No. 2 shaft is 66' deep.

Transportation facilities have been bad, but the completion of the Atherton-Herberton railway permits ore to go to the Mount Molloy smelter, instead of, as formerly, to the Chillagoe smelter. Equipment includes steam power and an air compressor. Company idle and mine being worked by tributors, Feb., 1913.

ANSWER MINE.

QUEENSLAND

Mine office: Selwyn, Queensland, Australia. Rigby & Daniels, owners. The mine, 16 miles from Selwyn, is developed to a depth of about 100'. The lode, averaging 6' wide, runs northwest-southeast and has 75° dip. Ore, carrying chalcocite, is said to average 26 to 38% copper. Was under option to the Hampden Cloncurry Copper Mines, Ltd., early in 1913.

ANTIGUA GOLD-COPPER CO.

HONDURAS

Office: 612 Hibernia Bank Bldg., New Orleans, La. Mine office: Minas de Oro, Comayagua, Honduras. O. M. Dunn, pres.; Jas. L. Wright and Jos. Weckerling, vice-presidents; L. S. Scott, sec.-treas.; preceding officers, Sylvan Levy, Lionel L. Lyons and E. L. Chappuis, directors; D. H. Lawrence, mine mgr.; E. B. Thompson, mine supt. Organized March 26, 1907, under laws of Arizona, capitalization \$2,000,000, shares \$5 par. Annual meeting, first Tuesday in September.

Lands, 531 acres, near the Honduras Rosario mine, 100 miles south-east of Puerto Cortez, carrying considerable timber in both hard and soft woods. Mine shows antigua workings, with about 3,500' of new openings, developing copper ores, giving assays of 2 to 3% copper, 2 to 4 oz. silver and \$2 to \$4 gold per ton, in limestone. Improvements include 4 buildings and a 48x80' frame stamp mill, of 30 tons estimated daily capacity, having 5 Allis-Chalmers stamps and 3 Huntington mills. No recent returns secured.

APPEALINNA MINE.

SOUTH AUSTRALIA

Mine office: Appealinna, Taunton Co., South Australia. J. Pyman, mgr., at last accounts. The mine, situated about 40 miles northeast of Hawker and 9 miles east of Wilpena Head Station, is developed by 3 shafts, deepest 175', all shafts being connected on the 50' level. The formation is a brecciated and conglomeritic limestone carrying copper glance, copper pyrites and native copper associated with iron oxides, calcspar and car-

bonate of lime. The ore, mainly chalcopyrite, occurs in veins and pockets, veins being 4 to 8" wide, cutting through the formation in all directions, and carrying values ranging from 23.8 to 58.5% copper. Discovered more than 50 years ago, and worked with slight interruptions since 1896, the mine now is idle for want of working capital.

APPLE TREE COPPER CO., N. L.

QUEENSLAND

Probably idle. Office: 371 Queen St., Brisbane, Queensland, Australia. Wm. Hasley, sec. Organized 1906, under laws of Queensland, capitalization £1,200, shares £6 par. Lands, 4 leases, area 45 acres, 1½ miles from Mount Cannindah, Bowen county, Queensland, having old workings consisting mainly of a 20' trench 500' long, showing a 6' vein with pay streaks of 2 to 4' width carrying 10 to 47% copper and up to 5 oz. silver and 3½ dwts. gold per long ton. Mine is said to show about 2,000 tons of ore.

APRILE; SOCIETÀ ANONIMA PER LE MINIERE.

ITALY

Idle. Mine office: Santa Lucia del Mela, Italy. Salvatore Aprile, mgr., at last accounts. Property shows chalcopyrite and cupriferos pyrrhotite, latter giving average assays of 1.83% copper, 26.66% sulphur and 120 grams silver per metric ton, the chalcopyrite giving average assays of 9.96% copper and 7 grams gold per metric ton. Property was under development, 1908.

APSLEY MINE.

NEW SOUTH WALES

Mine office: Perth, Bathurst Co., N. S. W., Australia. Francis Drake, mgr., at last accounts. Mine, 5 miles from Perth, has been worked intermittently, under different owners, since about 1875, and production, 1876, was 20 tons fine copper. Mine was reopened 1907 by a syndicate, but operations were suspended shortly and option was then taken by Mr. Drake. The ore occurs as impregnations in schists, without defined walls, but the payable ore usually ranges 3 to 5' in width. Development is by a 240' shaft. On the 180' level, for a length of 45' and width of 5', the ore was chalcopyrite and sphalerite, associated with pyrite, assaying 7.13% copper, and for 53' on the 240' level, with an average width of 7' 6", the ore averaged 7.92% copper. Ore carries up to 3 oz. silver per long ton, with a trace of gold. Property considered promising.

ARAGON COPPER MINES, LTD.

SPAIN

Idle several years for lack of funds. Office: 12 Lime St., London, E. C., England. Mine office: Tobed, Zaragoza, Spain. Baron Gaston de Fontenillat, chairman; Aimé Bonna, vice-chairman; preceding officers and J. D. O'Brien, directors; A. Lewis Lanseigne, sec.-treas. Organized Oct. 29, 1903, under laws of Great Britain, as Rio Grio District Copper Co. (Tobed & Codos Exploration), Ltd., with capitalization £100,000, shares £5 par, increased, May, 1904, to £130,000, shares £1 par; issued £120,621 and name changed, Jan., 1907, to present title. Lands, 14 claims, reported by company to be of 1,100 acres area, bought for £96,000 in full paid shares. Ore is claimed to average about 7% copper.

ARAKAWA MINE.

JAPAN

Owned by Mitsui Bishi Goshi-Kwaisha.

ARAMAYO FRANCKE MINES, LTD.

BOLIVIA

Office: 148½ Fenchurch St., London, E. C., England. Mine office: Tupiza, Potosi, Bolivia. F. A. Aramayo, chairman; L. A. Kensington, sec.; preceding officers, J. D. Campbell, B. Dale, I. Gutierrez-Ponce and V. M. Michaelis-Braun, directors; M. Roberts, mgr. Organized Oct. 17, 1906, as Aramayo Francke & Co., Ltd., capitalization £500,000 in £10 shares, increased, Aug., 1909, to £600,000 in shares of £1 each; issued, 596,590 shares. Debentures, £60,000, 6% bonds, created March, 1909, are redeemable at 105, by annual drawings of £10,000, repayable July 1. Name of company

changed to present title, Jan., 1911. Fiscal year ends May 31. Dividends paid per share: 6d. in 1909; 1s. 6d. in 1910; 2s. in 1911; 3s. in 1912.

Property includes the Aramayo Francke & Co. mines and metallurgical works in North and South Chichas provinces, the Santa Barbara and Santa Elena concentration works and 817 hectares on Chorolque mountain; the Cotani mines, Quechisla smelter, the Tasna tin mines, area 1,460 hectares, and concentrator and smelter at Buen Retiro; the Chocaya tin and silver mines, area 32 hectares, and various other lands and mining rights.

Production of copper was begun, Sept., 1912, and in 1913 was in neighborhood of 40 tons monthly.

ARAMO COPPER MINES, LTD.

SPAIN

Office: 2 Metal Exchange Bldg., London, E. C., England. Mine office: Pola de Lena, Asturias, Spain. A. van Strallen, Z. Merton, E. R. Merton, H. Gardner and L. Corvilain, directors; C. W. Aston Key, sec. Organized July 3, 1897, under laws of Great Britain, capitalization £40,000, shares £10 par. Property is the Aramo copper and cobalt mines, bought for £20,000 in full-paid shares. No accounts are made public. Idle some years owing to litigation now terminated in company's favor. Planned to resume operations some time during 1913.

ARDTULLY COPPER MINES, LTD.

IRELAND

Secretary and office: E. O'M. Leahy, 4 Stephens Green, Dublin, Ireland. Mine mgr., J. Heckie, Clontoo, Kilgarvan Co., Ireland. P. W. Shaw, J. Nelson, W. L. Joint, M. Anderson and H. Walker, directors. Organized June 3, 1911, capitalization £15,000, shares 5s. par; issued, 53,799 shares.

Property is a leasehold for 99 years on the old Ardtully mines, area 14 acres, and the mining rights to 265 acres adjoining, the latter being subject to an agreement calling for the payment of £20 for each shaft sunk and worked above 6, and the whole property being subject to an annual rental of £200, and a royalty of 5%.

The Ardtully mines have undergone considerable development in past years, and ores shipped to Swansea for smelting yielded 15% copper and 15 oz. silver per ton.

AREACHAP COPPER MINES, LTD.

CAPE PROVINCE

Office: 2 Transvaal Bank Bldgs., Fox St., Johannesburg, Transvaal. Wm. Edwin Bleloch, chairman; preceding officer, Frank E. Rivas, Francis Oats, N. Langkilde and J. A. Thorburn, directors; J. S. Richardson, sec.; J. M. Calderwood, cons. engr.; Wm. Fletcher, mgr.; J. Jones, smelter supt. Organized Nov. 10, 1908, under laws of Transvaal, capitalization £30,000, shares £1 par. Annual meeting, second Thursday in August.

Property was a leasehold on 45,000 acres, 16 miles from Upington, Gordovia, Cape Province, abandoned, 1910, after nearly £30,000 had been spent in development work. Option surrendered and company idle, May, 1913. Described Vol. X.

ARGHANA MAADEN MINES.

TURKEY

Office: care Imperial Minister of Forests & Mines, Constantinople, Turkey. Mine office: Arghana Maaden, Diarbekir, Turkey. Property is owned and operated by the Turkish crown.

ARIÈGE, LTD.; SOCIÉTÉ MINÈRE DE L'.

FRANCE

Presumably idle. Office: 3 London Wall Bldgs., London, E. C., England. Mine office: St. Girons, Ariège, France. Albert Simon and Thos. Turketine, directors; J. Edsall Davis, sec. Organized March 8, 1901, under laws of Great Britain, capitalization £10,000, increased, 1905, to £15,000, shares £10 par; issued, £13,000. Debentures, £1,110, at 6%. Lands include

mining properties in the communes of Riverenert, Esplas, Rimont and Castlenau-Durban, in the arrondissement of St. Girons.

ARMONIA; COMPAÑIA LA MINA.

CHILE

Mine office: Carrizal Alto, Atacama, Chile. Property is an old mine, opened to depth of 414 meters, which has been a considerable producer in the past, but production has been small for some years past.

ASHIO MINES.

JAPAN

Owned by Furukawa Mining Co. and described under that name.

ASTROLABE MINING SYNDICATE.

PAPUA

Mine office: Port Moresby, Papua, British New Guinea. Lands, 150 acres, near Sapphire creek, 16 miles from Port Moresby, main tract of 120 acres being a reward claim for discovery. The main tract has a 50' shaft, said to show a 6' vein carrying cupriferous and arsenical pyrite, giving assays of 3% copper, with traces of gold and silver, but the surface ores, in alluvium, are mainly malachite, giving returns, 1906, from shipment of 17 tons, of 26.8 to 32% copper, with traces of gold. Apparently this ore was secured from detrital material, deposited by the Laloki river. A 30-acre tract lying 1 mile east of the main workings shows a gossan carrying green carbonate stains assaying 3 to 4% copper, and a short tunnel shows a little malachite and cuprite.

A government report, 1913, states that the sulphide ores below the enrichment zone are highly basic and though low-grade in copper can be cheaply smelted with a saving of the small gold and silver contents for electrolytic separation. The report states that prospects are encouraging and should induce further developing.

ATACAMA; SOCIEDAD INDUSTRIAL DE.

CHILE

Office: Copiapó, Atacama, Chile. Works office: Tierra Amarilla, Chile. Mine office: Almolanos, Chile. Company is controlled by the British house of Edwards & Co.

Properties include the Descubridora, San Pedro, Rincon and Lautaro mines.

The Mina Descubridora, at Puquios, opened to depth of 700' by deepest shaft, has veins with lenticular orebodies, along limestone contacts. Ores carry chalcopryrite, associated with much pyrite. Equipment includes a steam plant with Stirling water-tube toilers, and electric power. The mine employs about 80 men. Production, 1908-09, was about 120 metric tons monthly of 15% copper ore.

The Mina Lautaro, in the San Antonio district, carries large quantities of chalcopryrite ore of 5 to 7% tenor, with limey gangue, in a porphyry dike.

The San Pedro mine has a fissure vein, opened by a 165' shaft, having an electric hoist. The Mina Rincón, opened to length of about 1,300', has a steam hoist. Company also owns mines at El Morado, Copiapó, but costs of about \$15 per metric ton for ore forbid any great production.

The concentrator, at Lautaro, built 1904, has a large hydro-electric installation, utilizing the power of a nearby river.

The company has two smelters, known as the Tierra Amarilla and Caldera, on the line of the Copiapó & Interior railway, which do a general custom business, and treat silver-lead ores, as well as copper.

The Tierra Amarilla smelter has 6 reverberatory furnaces, two 3-deck calcining furnaces, 2 reverberatory furnaces for Chile bars, and two 54x54" blast furnaces. Power plant includes four 110-h. p. boilers and 3 small electric motors. Fuel is imported coal and coke, latter used in charges of 1 ton to 6 tons of ore. Product, when working, is argentiferous and auriferous Chile bars and matte. The Tierra Amarilla smelter is idle, as the mines cannot feed both smelters.

The Caldera smelter, of about 200 metric tons daily capacity, is modern, having a 20-ton reverberatory furnace and two 100-ton 40x120" blast furnaces, in parallel. Sea water was used for the water jackets, but was found to corrode and destroy them. Coke charges of 13% are employed. There are 2 Connersville blowers, actuated by a 65-h. p. 240-volt Bullock electric motor. Slag is hauled by mules and dumped into the sea. Management installed sintering pots, 1912. The converter department has 2 stands and 8 Allis-Chalmers shells, 72x100" in size. The smelter has a Dodge crusher with 35-h. p. motor, for linings, and a Maison Beer briquetting press with a 30-h. p. motor, of 30 metric tons capacity hourly. Production is matte, containing about 130 grams silver and 9 grams gold per metric ton, shipped to New York for electrolytic refining, as converter department has been idle since 1907. The power plant includes a producer gas plant of 600-h. p. capacity, with a 266-h. p. 2-cylinder gas engine, and 240-volt 833-ampere Bullock electric generator. Equipment includes an electric motor, and hydraulic and electric accumulators.

Production was 2,166,235 lbs. copper in 1908, and 2,272,465 lbs. copper in 1909. No recent returns secured.

ATBASAR COPPER FIELDS, LTD.

SIBERIA

Was absorbed, 1913, by the Spassky Copper Mine, Ltd., shareholders receiving 1 Spassky share for every 2 Atbasar shares held. (See "Spassky," described elsewhere in this volume.)

ATE MINE.

JAPAN

Mine near Komatsu, Kaga, Japan. Saichi Moriyama, owner. The mine has 2 main veins, in liparite and brecciated tuff, 1 being a fissure, the other called a contact vein. Where these veins cross, rich ore occurs, but a little distance from the intersection the veins thin out and the ore is poor. Ore carries chalcopyrite, associated with pyrite, bornite and tenorite, and averages about 10% copper in the upper portions, but carries no silver or gold.

Equipment includes a 350-h. p. steam installation and mine employed an average of 160 persons, 1908. Recent production has been as follows: 231,484 lbs. fine copper in 1900; 194,305 lbs. in 1907; 134,087 lbs. in 1908. Recent production withheld.

ATLANTA MINE.

QUEENSLAND

Flanagan Bros., owners. Mine in the Herberton gold and mineral field, Queensland, Australia. Developed by 90' shaft with level at 40'. Shipped 40 tons of copper ore to Chillagoe, 1912.

ATTUNGA COPPER MINING SYN.

NEW SOUTH WALES

Office and mine: Attunga, Inglis Co., N. S. W., Australia. R. G. Gibbons, sec.; W. H. Edwards, mgr. Organized 1902, as a private syndicate, capitalization £12,000, shares £1 par; issued, £11,500.

Lands, 5 claims, area 75 acres, and a 20-acre smelter site, 9 miles east of Attunga, in the Tamworth division of the Peel and Uralla district. Property shows contact deposits between limestone and granite, in a garnetiferous formation 5 to 60' wide. One orebody, under development, of 16' estimated average width, traceable 1,200', is opened by pits and shafts of 20', 20', 35', 38', 280' and 302', and by 7 tunnels, 2 longest 310' and 910', workings being estimated to show 30,000 tons of ore, with 13,000 long tons blocked out for stoping. Mine has 6 levels opened. Ore, oxidized and carrying carbonates to depth of about 750', ranges 1 to 21% in copper; sulphides in bottom of mine show nodules of bornite and run 1.5 to 11.9% copper, average of ore being estimated by management at about 6% copper, 7 oz. silver and 10 dwts. gold per long ton. Mine has steam power and several buildings.

ATVIDABERGS KOPPARVERK; AKTIEBOLAGET. SWEDEN

Office, mine and works: Atvidaberg, Ostergothland, Sweden. Baron Theodor Adelswärd, pres. and gen. mgr.; Axel Nygren, supt.; C. A. Rudehus, smelter supt. Organized 1900, under laws of Sweden, capitalization 900,000 kroner, shares 1,000 kroner par, fully paid.

Lands include the Atvidaberg and Bersbo mines, developed by 8 shafts, of 90 to 410 meters depth, latter being the deepest in Sweden, with about 4,000' of workings. Development has proven large quantities of chalcopyrite and sphalerite, in quartzose gangue, with increasing zinc and decreasing copper at depth. Ores are difficult of reduction, requiring special treatment.

Equipment includes a hydro-electric power plant operating the mine and works. The former smelter, at Bersbo, 9 kilometers from the mine, with rail connections, burned 1905, was described Vol. VIII. The new smelter is at Atvidaberg. Mine has been developing, without production, since 1902, when production was 163,270 lbs. fine copper.

AURELIA MINE.**CHILE**

Office and mine: Chuquicamata, Calama, Antofagasta, Chile. Employs 40 men and produces about 100 metric tons of 13% copper ore, monthly.

AVEYRON; SOCIÉTÉ DES MINES MÉTALLIQUES DE L' FRANCE

Idle. Office: 16 Rue du Colysée, Paris, France. Mine office: Saucières, Millau, Aveyron, France. M. Mougin, pres. Property is lands carrying copper, silver-lead and zinc ores, in the communes of Saucières and Saint Jeandu-Bruel, department of Aveyron.

AYACUCHO COPPER SYNDICATE, LTD.**VENEZUELA**

Office: 7 St. Helen's Place, London, E. C., England. T. N. A. Grove, J. P., R. A. Hoblyn, J. L. Major and H. A. Brundell, directors. E. G. Brunker, sec. Organized Sept. 26, 1912, under laws of Great Britain, capitalization £1,500, shares £1 par; 15s. paid in, to acquire mining properties in Venezuela.

AZALIA; NICOLÁS.**PERU**

Office and mine: Morococha, Junín, Peru. Lands, 2 pertenencias, known as the Alicia and Dante mines, former yielding ore of about 10%, and latter about 12% in copper tenor. Production, 38,360 lbs. fine copper and 55 kgs. silver annually at last accounts.

BACKUS & JOHNSTON CO.**PERU**

Office: Desamparados Station Bldg., Lima, Perú. Works office: Casapalca, Oroya, Junín, Peru. A. J. Bennett, pres.; R. R. Storrek, sec-treas.; preceding officers, M. J. de Witt, directors. H. W. Ross, supt.; J. Irving and A. Howie, mine supts.; H. Ross, smelter supt.; B. A. Simpson, purch. agt.; N. M. Zopf, assayer. Organized July 31, 1896, under laws of New Jersey, as successor of Backus & Johnston, who began business 1889. Capitalization \$800,000, shares \$10 par, fully paid; bonds, \$500,000, issued, \$375,000, bearing 8% interest. Annual meeting in January.

Company owns or controls large groups of copper-silver mines in Morococha about 21 miles by rail from Casapalca. The best of these mines is the Natividad, owned jointly with the Morococha Mining Co. Company also owns the Victoria, Alapampa and Churruca mines in Casapalca.

The Natividad mine is opened to the 5th level, developing a vein about 4' wide carrying ore averaging about 14% copper and 14 to 70 oz. silver per ton. The mine water caused much trouble in 1912, now obviated by lead-lined pipes and bronze pumps. Production, 1912-13, was 1,500 to 2,000 tons monthly carrying 8 to 16% copper and 10 oz. silver.

The Casapalca mines develop a lode for nearly $1\frac{1}{2}$ miles by tunnels with backs of 2,600'. The ores average 2% copper and 30 oz. in silver.

The Casapalca smelter at Casapalca, on the Oroya railroad, 92 miles from Lima, at an altitude of 13,600', does a general custom business as well as treating company ores. In 1912, the smelter treated 85,733 tons of copper-silver ore. The concentration mill, recently remodeled, handles 300 tons daily and is equipped with 2 Krupp ball mills, 2 Hancock jigs and 6 Overstrom and Ferrari tables. The smelter, rebuilt in 1913, now has a capacity of 15,000 tons monthly, a new 52x160" blast furnace, 2 new basic lined convertors and a new stack, being added to the plant.

The hydro-electric plant has been enlarged to 4,200 h. p. and will deliver 3,000 h. p. at smelter. Works employ about 800 men and produce a high-grade silver-copper matte assaying about 50% copper and 280 oz. in silver, which is shipped to the American Smelting & Refining Co., Perth Amboy, New Jersey.

Production of company in 1912 was \$9,970,000 lbs. fine copper, 2,439,000 oz. silver, with an estimated production for 1913 of 12,000,000 lbs. copper and 3,000,000 oz. silver.

The death of Mr. Johnston in 1913 has deprived the company of its energetic and capable head.

BADAJOZ COPPER MINES, LTD.

SPAIN

Dissolved Feb. 25, 1911. Formerly at Pueblada, Badajoz, Spain. See Vol. X.

BAILEY'S COPPER, LTD.

TRANSVAAL

Idle. Office: Transvaal Bank Bldg., Johannesburg, Transvaal. Mine office, Section C., Barberton, Middelburg, Transvaal. B. de R. Malraison, chairman; L. K. Jacobs, sec. Organized May, 1907, under laws of Transvaal, capitalization £15,000, shares £1 par. Lands, 96 base metal claims, in the De Kaap valley, near the Barberton Copper Syndicate, on which work was begun July, 1907. Property has a 5' vein, traceable a quarter mile, opened by 2 shafts, "A" shaft being 85' deep.

BAILOR; SOC. ANONYME MINES DE CUIVRE DE.

HUNGARY

Office: 70 Rue de Namur, Brussels, Belgium. Baron d'Inkey de Pallin, director. Organized Feb. 14, 1907, under laws of Belgium, capitalization f2,000,000, shares f100 par. Property is in Hungary. Presumably idle, as no reply is received to letters sent above address.

BALADE MINE.

NEW CALEDONIA

Idle. Mine office: Ouegoa, Arama, New Caledonia. See Vol. X.

BALDWIN MINE.

PAPUA

C. R. Baldwin, owner, Port Moresby, Papua, British New Guinea. Property a group of claims adjoining the Astrolabe, 17 miles from Port Moresby, showing a vein of fair-grade copper ore.

BALFOUR BLOCKS COPPER MINES, N. L.

TASMANIA

Defunct. See Vol. X. Property, 2 sections, 80 acres, west of main fracture line of field. Shows dense, silicified slate changing to chlorite schist. Unpromising ground.

BALFOUR CONSOLIDATED COPPER MINES, N. L.

TASMANIA

Mine office: Mount Balfour, Russell Co., Tasmania. Lands, near the Frankland river, are 5 blocks, leasehold, being 2 adjoining blocks to the south, and 3 separate blocks to the north, shortly north of the Balfour Blocks Copper Mines, N. L. Transportation facilities are poor. Company owns a number of leases with an 8' vein of silicious ore carrying pyrite with chalcopyrite changing to covellite in a sericite gangue. "Property a prospect whose northern section is promising." (Gov't report.) Letter to mine returned marked "Left district."

BALFOUR PROSPECTING ASSOCIATION.**TASMANIA**

Idle. Office: 352 Collins St., Melbourne, Australia. Mine office: Balfour, Russell Co., Tasmania. Hal Sheppard, chairman; preceding officer, Max Gorler and J. A. Graham, directors; H. M. Fielder, local mgr.; C. McKie, supt. Capitalization £500, shares £10 par.

Lands, two 40-acre leases, formerly known as Chester's mine, on the western slope of Mount Balfour, about 3 miles southwest of Murray's Reward claim; 160 acres in the Norfolk range, 11 miles south of Murray's Reward, and 80 acres one-half mile eastward of latter group. The 160-acre tract, developed by tunnel, has a schistose ore channel of 145' reported width, showing streaks and bands, from a few inches to 4' in width, carrying bornite and chalcopyrite, assaying up to 20% copper. This property also shows a 25' quartz outcrop.

BALHANNAH COPPER MINING CO., LTD.**SOUTH AUSTRALIA**

Mine at Onkaparinga, Adelaide Co., S. A. Operated, 1867-76, as Balhannah Copper Co., succeeded by Balhannah Copper & Gold Mine Co. and produced about £25,000 worth of copper and £7,000 worth of bismuth, with gold, silver, antimony and graphite in small amounts. J. A. Sands, Esq., Royal Exchange, Adelaide, gave an option, March, 1913, for £60,000, with working capital of £20,000. Property described in government report, March, 1898. See Vol. X.

BALKAN COPPER CORPORATION, LTD.**TURKEY**

Affairs wound up. Company defunct. See Vol. X.

BANDAK ELEKTROLYTISKE KOBBERVAERK.**NORWAY**

Address: Aamdal, Skafsåsogn, Bratsberg, Norway. Admiral Borresen, managing director. Engineer Hybinette, director and supt. Organized under laws of Norway, 1912, capitalization 500,000 kroner. Half of the capital has been allotted to the managing director and the engineer who is the inventor of the electrolytic system to be employed, as an equivalent for the right to work the Aamdal mines.

The Aamdal is an old mine, reopened A. D. 1900, which was a considerable producer for nearly three centuries. The veins formerly worked were narrow but rich, and the mine shows considerable low-grade ore. Diamond drill borings, 1907, are said to have given good cores at depth of 1,400'. The principal ore is low-grade chalcopyrite and bornite, averaging about 2.5% copper, with a gangue of mica-schist and quartz.

The old mill, destroyed 1907, was replaced by a new mill, in 3 parts, having a crusher-house, 75-ton Ferrari ball mill and an Elmore vacuum oil concentration unit. Production was 240 long tons fine copper, under former ownership, in 1895, and 7,000 metric tons of ore, estimated to have yielded 375,000 lbs. copper in 1909.

BARAGUNDA MINES.**INDIA**

Mines office: Baragunda, Hāzaribagh, Bengal, India. Were operated, 1887 to 1891, turning out about 1,000 tons of copper in 5 years. Ore occurs as chalcopyrite, running only 1 to 3% copper, in a gangue of micaceous schist. All ore treated was carted 24 miles to the smelter at Giridhi. These are perhaps the most promising copper properties now known in India, despite the low grade of the ore and might be worked successfully if given rail facilities, adequate capital and good management.

BARANA COPPER SYNDICATE, LTD.**RUSSIA**

Office: 111-113 Queen Victoria St., London, E. C., England. Organized Oct. 24, 1912, to adopt an agreement with A. H. Foster and the Dominion Share & Debenture Corporation, Ltd., to acquire mining property in Russia. Capitalization £15,250; 15,000 preference shares, £1 each and 5,000 ordinary shares, 1s. each. Preference shares are entitled to a fixed cumula-

tive preferential dividend of 6% per annum and one-third of surplus profits, the ordinary shares taking the remainder.

BARAZARTE; SUCESION DE.

CHILE

Presumably idle. Mine office: Paposo, Taltal, Antofagasta, Chile. Property includes the Reventon mine, 400' deep, and the Abundancia mine, 380' deep, both opened in 1830, also La Unión mine. Has steam power.

BARBERTON COPPER CO., LTD.

TRANSVAAL

Letters unclaimed at Trust Bldgs., Fox St., Johannesburg, Transvaal. Mine office: Barberton, Middelburg, Transvaal. T. F. Allen, chairman. Organized July 25, 1907, under laws of Transvaal, as successor of Barberton Copper Syndicate, Ltd. Lands, 144 claims, near Noord Kaap. The manager stated, some years ago, that he was opening the biggest mining and smelting proposition in South Africa, which was a very ambitious statement, in view of the small amount of work done. Idle, but Bailey's Copper, Ltd., is operating section "C" at Barberton.

BARBERTON EXPL. & DEV. CO., LTD.

TRANSVAAL

Registered May 23, 1906. Property in Middleburg district, Transvaal. Went into voluntary liquidation Aug. 4, 1911. P. C. Bird, 18 Eldon St., London, E. C., England, receiver.

BARRY COPPER PROSPECTING SYNDICATE.

QUEENSLAND

Office: Mt. Garnet, Queensland, Aus. Organized Feb., 1913, capitalization £510, shares £5 par. Provisional directors: Dr. H. F. Perkins, R. J. Hood, T. J. Kerr and N. B. Bowden. A. M. Waddell, sec., Mt. Garnet. Company plans spending £300 in proving property.

Mines were opened A. D. 1600, and have been operated with more or less vigor for 3 centuries. Lands, in the Armenian Tauros, between Diarbekir and Kharpüt, include 6 different properties, of which only 3 have been worked latterly, 2 by the government and 1, to a small extent, by private parties. An excellent water power near the property is available from the western branch of the Tigris river. At the beginning of the century these mines were producing about 1,500 tons fine copper yearly, exported mainly to England, via Alexandria. Development is principally by tunnels. The mine water is strongly impregnated with copper and should be leached.

Selected ore, averaging about 12% copper, is smelted, with charcoal, to a matte of 60% copper tenor, fuel being scarce and expensive. The government has planned a new smelter, 1¼ miles from the mines, the ministry prescribing that the plant must be of the latest type, and reserving first call on 400 tons of copper at current market prices, net profit to be divided between the government and operators, in case the property is taken over by a private company. A 60-year concession on this property was given, 1910, to a Turkish company.

Production is about 3,000,000 lbs, fine copper yearly, part of which is taken by the Turkish government at a fixed valuation. The copper is shipped by camel to Tokat. The workmen are paid in food, clothing and tobacco, and mining and smelting processes are archaic in all respects. The property, under modern methods, and with good equipment, is capable of materially enlarged production.

BASILIO CACERES.

CHILE

Mine office: Pueblo Hundido, Antofagasta, Chile. Property is El Manto Tres Gracias mine, formerly a considerable producer, and employing 100 men, 1903, but of late years making a small production only, secured by a selection of rich ores from old dumps. The mine, now idle, shows large bodies of low to medium grade ore, and might become an

important producer if given adequate transportation facilities. Equipment includes a steam plant.

BATES; JOHN.

BOLIVIA

Office and mine: Coro Coro, La Paz, Bolivia. Property is the Santo Tomás mine, carrying native copper in conglomerate. Equipment includes steam power, and the property was a small producer of barilla copper at last accounts.

BAUSCH y TIANI; SOCIEDAD MINERA.

y FUNDICIÓN DE.

ARGENTINA

Office, mine and works: Chilecito, Rioja, Argentina. Property includes the Compañía and Mercedes mines. Has steam and water power and a smelter, known as the San Miguel, built 1876, for lead ores, at a cost of \$120,000, and altered, 1893, to treat copper ores of the Mexican district.

BEAUPARC COPPER MINES (1909), LTD.

IRELAND

Office: 36 College Green, Dublin, Ireland. Mine at Beuparc, County Meath, Ireland. Walter Hume, chairman; David Frame, managing director; R. Stokes and H. Grandy, directors; Stokes Bros. & Pim, secretaries. Organized in Dublin, Dec., 1909, capitalization £30,000, shares £1 par; issued 25,000, fully paid. Is a reconstruction of the Beuparc Copper Mines Co., Ltd. (See Vol. X.) Company owns copper mines at Beuparc and Dollardstown, County Meath, Ireland, with a lease of mining rights of 2,000 acres of the Lord Athlumney's estate.

Development at Beuparc by 240 shaft with levels at 80', 100', 140', 200' and 240', sunk on a vein 19½' wide. A concentrating mill was built, 1911, yielding 285 tons concentrate, sold for £2,109 to the Swansea smelter. Ore reserves estimated, July, 1912, at 16,785 tons. The Dollardstown property is idle.

Mine development for 1911-12 cost £12,516 and equipment £6,775.

BECHUANALAND COPPER CO., LTD.

RHODESIA

Office: Salisbury House, London, E. C., England. Operating office: Bulawayo, Rhodesia. Mine office: Bushman Mine, Francistown, Rhodesia. Cromwell Hockley, chairman; preceding officer, Thos. Joyce Seel and Geo. Wm. Staunton, directors; T. Donald, sec.; B. F. McDowell, mine mgr. Organized May 18, 1909, under laws of Great Britain, capitalization £135,000, shares 10s. par; issued, 150,488 shares. Shares are listed on the London Stock Exchange. Annual meeting, second Thursday in September.

Property promoted, 1909, by vendor, Bechuanaland Exploration Co., Ltd.; 120,000 shares offered public. L. Hirsch underwrote 100,000 shares for 5% commission and a 2-year option on 50,000 shares at par. Annual report to May 31, 1912, showed cash £13,805, debts £2,342 and credits £54.

Property, bought for £15,000 in fully paid shares and £10,000 cash, is held under license from the British South African Co., and is subject to a 50% royalty to that company as soon as profits are earned. Lands, 240 claims, including 180 copper claims, 120 miles south of Bulawayo, these being the Bushman group of 60 claims and the San Toy, Nondu, Kelly-Kenny and Outlaw groups of 30 claims each, with 60 claims adjoining the Bushman group that were pegged out (located). Company has right to locate 30 additional claims. These properties show ancient workings and have 3 lenticular fissure veins carrying chalcocite, along contact between dolomite and pegmatite dikes.

Development is on the Bushman group, which has shafts of 205', No. 2; 300', No. 5; 200', 176' and 203' with 9,585' of workings up to March, 1913. New development for year ending May 31, 1913, 2,458' at a cost of £4 7s. per foot. This includes 175' winze work, 317' shaft sinking and 1,966' drifting and crosscutting. Mine is developed to 300' level, the first level show-

ing 4 ore shoots with aggregate length of 608' and average width of $3\frac{1}{2}$ ', carrying 5 to 17% copper. On 2nd level there are 7 ore shoots developed, whose total length is 597', average width 50" and contents 9 to 23% copper. Third level shows orebodies irregular.

Equipment includes a 20-h. p. steam plant, with 3 small hoists and 6 buildings. Company plans development in depth by winze and erection of reduction plant after proper treatment has been decided upon.

Property good, but orebodies small and narrow, hence working costs must be high. Railroad freight rates are also high. Promises with present careful management to become self-supporting and eventually profitable.

BECHUANALAND EXPLORATION CO., LTD.

RHODESIA

Secretary and office: T. Donald, 365 Salisbury House, London, E. C., England. African office: H. U. Moffat, supt., Bulawayo, Rhodesia. E. Davis, chairman; T. J. Seel, G. Cahen, C. Hockley and Sir E. H. Dunning, directors. Organized April 1888, capitalization £200,000, shares 10s. par, fully paid and issued. Dividends paid since 1895, last being in Aug., 1913, of 4%. Is a financing, development and holding company which has floated and manages the Bechuanaland Copper, Northern Copper, Rhodesia Copper and Bwana M'Kubwa Copper companies.

BEDE METAL & CHEMICAL CO., LTD.

NORWAY & SPAIN

Office and works: Hebburn-on-Tyne, England. Spanish operating office: Manriques 9, Córdoba, Spain. Mine office: Puebla de Guzmán, Huelva, Spain. Sir Andrew Noble, Bart., K. C. B., chairman; W. D. Crudas, Sir Alfred M. Palmer, Bart., W. Hall and J. E. Tully, directors; Wm. M. Brown, sec.; Richard Eshott Carr, gen. mgr. in Spain; Chas. R. Sams, mine supt. Organized May 16, 1872, under laws of Great Britain, as successor of Bede Metal Co., capitalization £288,400, shares £25 par, reduced 1887, to £100,000 and 1,456 bonus shares, shares £10 par. Present capitalization £115,360, shares £1 par, fully paid. Debentures, formerly £125,000, have been fully paid. Dividends, 1879-1907, including payments of previous company, aggregated £108,464. Dividends were £14,320 in 1906; £20,048 in 1907; £14,320 in 1908; £17,184 in 1909. Statement issued March, 20, 1912, showed a credit balance of £11,127. Company is primarily a manufacturer of acid and chemical products, but also is a considerable producer of copper from Spanish and Norwegian cupriferous pyrite.

Spanish mining lands are 71 hectares, with about 50 acres miscellaneous lands, known as Las Herrerias mines, held under a small royalty, having 7 workings, in 2 groups. Property shows Devonian schists, with porphyry outcrops near the orebodies, which are irregular lenses of massive cupriferous pyrite, in schist, with dip from vertical to 40° north. There are 7 orebodies, of which 6, under development, range from 1 to 40 meters in width, the main orebody, of about 12 meters average width and 400 meters length, carrying chalcopyrite and chalcocite, finely disseminated through pyrite, estimated by management to average 1.4% copper and 45% sulphur, with very small quantities of zinc and lead, of no commercial value. Development is by the Extraction shaft of 302', and the San Mateo shaft of 250', each having a 15x20" hoist, the mine having about 150,000 tons of ore blocked out for stoping. The western part of the mine is worked opencast, all ore being stoped, and openings filled with waste. The property is served by the Guadiana railway.

Buildings include 4 engine houses, a laboratory, warehouse, stables, 4 dwellings for officials and 20 cottages for workmen.

The ore is piled in large flat-topped heaps, which are irrigated regularly, the resulting liquors passing over iron, for precipitation. There are

2 freshwater dams and 4 leaching dams, of masonry. Product is precipitate of 70 to 80% copper tenor, which is shipped to the company's smelters at Hebburn-on-Tyne for reduction and washed sulphur ore, which is shipped to the company's British works and also to France, Germany and Russia. Ore in leach heaps is charged to general production, the company's balance sheet depreciating rather than padding actual assets.

Ore treated, 1909 was 51,000 long tons, carrying an average of 1.48% copper, won at an average cost of 5s. per ton for mining, and the cost of fine copper, f. o. b., in the form of precipitate of 73% copper tenor, was £42 per long ton. Forces are about 300 men at Las Herrerias. Production of Las Herrerias mines to end of 1909 was about 6,800 long tons of fine copper and has been about 1¼ million pounds annually since then.

The Killingdál mine, in Aalen, north of Røros, Norway, is operating under lease from the Norwegian owners. Ore is cupriferous pyrite, averaging about 1.5% copper and 45% sulphur, production being about 20,000 metric tons of ore yearly. Production, 1905, was 512,960 lbs. fine copper, and 1909 was 850,000 lbs. fine copper from the Killingdál mine. Production about 110,000 tons of ore annually, of which amount 25,000 tons was export ore in 1912.

BEECHWORTH GOLD MINING SYN. NEW SOUTH WALES

Letters to mine at Cobar, Robinson Co., N. S. W., Australia, unanswered. Lands, 6 miles north of the Queen Bee mine, carry a promising gossan, containing gold, silver and copper values, opened by a 200' shaft showing auriferous and argentiferous copper and lead ores.

BELALIE COPPER MINING SYNDICATE. SOUTH AUSTRALIA

Owens the Belalie, originally known as the Wheal Sarah and later as Bundaleer mine near railway station of that name. Property has 2 veins, 30' apart and 20 to 30" thick, carrying 6 to 8" of high-grade ore on each wall with 18" low-grade ore between. Developed by 33' shaft below tunnel level. Reported on favorably by Government Inspectors. Idle, 1912.

BELGE POUR LA RECHERCHE ET L'EXPLORATION

DES MINERAIS; SOCIÉTÉ ANONYME.

ITALY

Office: Brussels, Belgium. Mine office: Massa Marittima, Grosseto, Tuscany, Italy. Organized under laws of Belgium. Property is the Poggio al Guardione mine, carrying slightly cupriferous iron pyrites. Idle, and letters unanswered, 1913.

BEOGRADCHIC EXPL. SYNDICATE, LTD.

BULGARIA

Office: 88 Bishopsgate, Within, London, E. C., England. J. T. Boyce, J. Kenarledski, H. S. Wescott, directors; A. Thorpe, sec. Capital £1,000, shares £1 par, fully paid. Organized May 23, 1907, to take option on La Chanse Copper Concession, near Belogradchik, Bulgaria, and rights were leased in June of same year to Widin Copper Syndicate, Ltd. (See that company.)

BELTANA RAPID ORE TREATMENT SYN. SOUTH AUSTRALIA

Office: 36 Royal Exchange, Adelaide, South Australia. Mine office: Beltana, South Australia. C. G. W. Pfitzner, pres. and gen. mgr.; A. Rehder, vice-pres.; D. R. Sanda, sec.; preceding officers, A. D. Pfitzner, directors. Capitalization £6,000, shares £20 par, fully paid. Annual meeting, November. Property was formerly known as the Copper Queen mine, 3 miles west of Beltana and 4½ miles from railroad. Shows wide zone of decomposed slate carrying nodules and seams of malachite and stains of vanadium; 2 claims, total area 80 acres, mineral lands 40 acres. A shaft 72' deep encountered a flow of 2,000 gals. water a day at a depth of 60' and a short east crosscut has been driven. Government Inspector of Mines sampled property for vanadic acid, assays showing 0.4 to 11.08% copper and all

but 1 sample carrying vanadium from trace to 0.6%. Has 8-h. p. boiler, 1 hoist good for 200'; concentrator has 3 steam stamps, 4 solution vats and 4 cement precipitation vats. Crushed ore treated by leaching process. Product shipped to Wallaroo smelter, Port Adelaide.

BEMBE MINE.**PORTUGUESE WEST AFRICA**

Mine office: Bembe, Angola, Portuguese West Africa. Situated about 110 miles inland from Atlantic coast and 75 miles south of Belgian Congo frontier. Only development done in 1910 was sinking of holes, by the natives, 3 to 4' in diameter, untimbered, to a depth of 24 to 30'. Is a community property owned by natives.

BENALACK COPPER MINE.**SOUTH AUSTRALIA**

Property is situated 1 mile east from Nicholl's Knob. Shows two veins of 3" and 10", respectively, 40' apart, converging southward, developed by shafts 32' and 70' deep.

Drifting at 60' in depth showed the vein to be from 12 to 18" wide, with high-grade ore in seams and bunches, chiefly malachite, bornite and copper pyrites in ferruginous calcite. Sample from bottom of shaft showed 2 dwt. gold, 14 oz. silver and 32.3% copper per ton. Veins small and former company (1907) unable to make property profitable.

BENCREE GOLD & COPPER MINES, N. L.**NEW SOUTH WALES**

Mine office: Forest Reefs, N. S. W., Australia. B. J. Harris, mine mgr., at last accounts. Property shows a number of veins, of which No. 4, up to 6' in width, is said to give average assays of 18 to 20 dwts. gold per long ton. Development is by a 200' shaft and values are in gold rather than copper. Presumably idle.

BENOWRIE COPPER MINE, LTD.**SOUTH AUSTRALIA**

Idle. Mine office: Olary, South Australia. Company succeeded the Benowrie Copper Co. Lands, 20 miles northeast of Olary, known as the Mary mine, worked occasionally since 1890, have what apparently is a stratified bed, between granite and clay-slate, carrying bunchy ore, mainly azurite and malachite, associated with hematite, with silicious gangue, of low average grade, slightly argentiferous and carrying from colors to 3 dwts. gold per long ton. Development is by a large open cut, 50' wide, 250' long, and 5 to 30' deep, with a number of shallow pits, and a 105' shaft, cutting an 18" vein of sulphide ore at 65' and a 30' vein at 75', latter giving assays of 13.5% copper. Was a small producer about 1910.

BENTÍN; RICARDO.**PERU**

Mine office: Huarochirí, Lima, Peru. Lands, 58 Pertenencias, in the Casapalca district, including the Aguas Calientes mine, developed mainly by the Unión tunnel, carrying argentiferous lead, copper and zinc sulphides, values being mainly in silver, with considerable copper and lead as by-products. Ore is mainly of concentrating grade. Mine is connected with the Casapalca smelter by a 3½-kilometer railway.

The Aguas Calientes mill, of 30 metric tons daily capacity, includes a laboratory, and has water power, developed by a Pelton wheel, employing about 20 men. Property employs about 120 men. Production, 1908, was 8,871 metric tons ore yielding 391,140 lbs. copper, 209 metric tons lead and 13,815 kgs. fine silver. Letters unanswered, 1913.

BERGFRIEDEN; GEWERKSCHAFT.**GERMANY**

Idle. Office: Langelaube 25, Hanover, Germany. Mine office: Friedrichsroda, Hanover, Germany. Graf M. von Bernstoff, Ernst Sollors and Th. Steegmans, executive committee; Heinrich Burghardt, supt., at last accounts. Property consists of copper lands near Friedrichsroda and oil fields near Steinförde.

BERTHIN; ANGEL.**BOLIVIA**

Property consists of 40 hectares in Province of Pacajes. No work done recently. Ore is copper with high gold values.

BERTHIN; NOEL.**BOLIVIA**

Property consists of 105 hectares in Province of Pacajes. Ore is primarily copper with high gold values.

BESSHI MINE.**JAPAN**

Owned by Sumitomo Copper Co., and described thereunder.

BILBAINA ASTURIANA; COMPANIA MINERA.**SPAIN**

Property in province of Asturias, Spain, sold to the Carrena Copper Mines, Ltd., and described under that title.

BIO-BIO (CHILI) COPPER SYNDICATE, LTD.**CHILE**

Presumably idle. Office: Finsbury House, Blomfield St., London, E. C., England. Mine office: Los Angeles, Magallanes, Chile. Organized July 27, 1906, under laws of Great Britain, capitalization £30,000, shares £1 par; issued £20,500, in 20,000 fully paid shares, which were given for the lands, and £500 shares, 1s. paid. Only exploratory work has been done. Mine shipped, 1909, to Valparaiso, 13,401 kgs. of 17% copper ore, and 2,278 kgs. fine copper, secured from exploratory work.

BIONAZ; SOCIETÀ MINIERE DI.**ITALY**

Presumably idle. Mine office: Aosta, Torimo, Piedmont, Italy. Property is the Bionaz mine, which was a small producer of copper ore, about 1907.

BIRTAVARRE KOBBERVAERK.**NORWAY**

The Birtavarre mine is situated in Lyngen, Norway. Began producing, 1910, but work was delayed owing to floods and a strike at the mine. Mine produced 282 tons of bessemer copper in spring of 1913.

BISMARCK; KUPFERERZ GEWERKSCHAFT.**GERMANY**

Probably closed down. Office and mine: Hanover, Braunschweig, Germany. Alex. Eichwald, A. Rambke and O. Wolfe, executive committee. Organized Nov. 20, 1899, under laws of Germany. Property, various copper and iron mines, including the Morgenrothe, in Brunswick, and the Rothbart, in Prussia, which carry malachite and other copper ores. The iron-ore mines are near Ruhla, Saxe-Weimar and company also has done a little exploratory work in Braunschweig-Gotha, and in the grand duchy of Gotha.

BLACK EAGLE COPPER MINE.**SOUTH AUSTRALIA**

Property situated 18 miles east of Beltana, South Australia, and 1 mile south of Ediacara mine. Shows a large outcrop of ironstone running north and south on the side of a hill, 75' above the plain. Eighty-three tons of 19% copper ore was shipped in 1910, and in 1912, 22 tons shipped averaged 9.6% copper, a later shipment of 116 tons yielding 9¼% copper. Developed by tunnels with drifts on the vein. Prospecting work is in progress on the West lode, showing a vein 3 to 5' wide of hematite and quartz carrying veins and nodules of copper carbonate. Promising.

BLANCA TORRE DE COLLAHUASI; COMPAÑIA MINERA.**CHILE**

Office: Valparaiso, Chile. Mine office: Collahuasi, Tarapacá, Chile. Organized June 23, 1906, under laws of Chile, capitalization £120,000, shares £1 par. No trace of operations secured. Company presumably dead.

BLANTON COPPER MG. SYND.**HAYTI & SANTO DOMINGO**

Office: The Bourse, Philadelphia, Pa. Mine office: Bucaro, San Cristobal, Santo Domingo. E. A. Blanton, Jr., pres. and gen. mgr.; Wm. Herbert Sickels, vice-pres.; Henry C. Martin, sec.; A. M. Masters, treas.; preceding officers and Ralph C. Lupton, directors; Otto A. Peterson, supt. Organized Feb. 16, 1910, under laws of Delaware, capitalization \$200,000, shares \$25

par, nonassessable, in \$25,000 of 7% preferred stock and \$175,000 common stock. Annual meeting, first Monday in January.

Lands, 700 acres, in a tract 5,000x6,000', held under government concession, including the Bucaro mine, on the Rio Nigua, 27 miles west of San Domingo, bought of San Cristobal Mining Co. Property shows orebodies in limestone, near a porphyry contact, one orebody in the Bucaro mine carrying chalcopryite, bornite and chalcocite, all auriferous and argentiferous, giving assays of 3 to 24% copper, and estimated to carry \$3 per ton in combined gold and silver values. Development is by tunnel, including a 250' crosscut tunnel and drift tunnels of 75', 80', 160' and 100', also by an open cut, estimated to show 50,000 tons of ore. A water power, 7,000' from the mine, is said to be capable of development. Company hopes to secure a 50-kilometer railway from San Domingo to San Cristobal. Company also owns mineral lands along the railway line from Gonaives, on the west coast of Haiti, where bunches of oxidized copper ores occur in limestone near igneous contacts. Company not regarded favorably and West Indian deposits are considered too spotty to permit profitable operation of mines.

BLAYNEY COPPER MINES & SM. CO., N. L. NEW SOUTH WALES

Secretary and office: E. H. Shackell, 360 Collins St., Melbourne, Australia. London sec., E. Habben, Palmerston House, London, E. C., England. Mine and works at Blayney, Bathurst county, N. S. W., Australia. H. F. C. Keats, J. A. Amschel, C. Ballieu, J. L. Wharton and C. B. Jessop, directors, London. Organized Jan. 31, 1907, under laws of Victoria, capitalization £150,000, shares £1 par; issued, \$100,000, 14s. paid in. Was a reconstruction of New South Wales Mines & Smelters Co., Ltd., which was a reconstruction of the Blayney Copper Mines & Smelters, Ltd. Company owns the Blayney copper mine, idle 1906-11, but unwatered 1912.

Water carries as high as 60 lbs. copper to 1,000 gals., or double that treated in 1906 in the cementation plant. Production, 6 tons fine copper per month from this plant.

Property shows a strong orebody, 40' wide at 100' depth, in andesite, near the contact with Silurian sedimentaries, which show considerable crushing and shearing. Ore is chalcopryite with andesitic gangue. Mine is opened to depth of 337' and for a horizontal length of 680'.

Equipment includes both steam and electric power and the mine has a branch railway siding. The reduction plant, formerly doing a general custom business, was built, 1882, and overhauled and renovated, 1907. Equipment includes a small sampling mill with 3,500-ton storage-bins for ore, fluxes and fuel. The smelter has two 120-ton 40x168" blast furnaces, a small blast furnace for matte smelting, a large reverberatory furnace and an Edwards calcining furnace. Converter plant has 6x8' shells of the Leghorn type and a 6' Chilean mill for linings.

BLUE CREEK MINE.

NEW SOUTH WALES

Letters unanswered, 1913. Mine office: Yarrangobilly, Buccleuch Co., N. S. W., Australia. Lands, about 3 miles from the Limestone caves, in a very rugged country, carry a vein of about 12' width, having a 2' paystreak of rich ore. Mine is opened by a tunnel having a back of about 250'. Was developing with a small force, 1910.

BOB'S MOUNT MINE.

NEW SOUTH WALES

Letters unanswered, 1913. Probably idle. Mine office: Springfield, Bathurst Co., N. S. W., Australia. W. Paterson, sec. Organized 1906. Lands are about 8 miles from Orange and 9 miles south of the Mount Bulga. Mine, on which about £3,000 has been expended, has a 79' vertical main shaft, planned to be deepened to 100', connecting with a 170' tunnel,

showing a vein of about 4' average and 9' maximum width, carrying an ore-shoot 92' long, and smaller shoots of 10 and 50' length.

BOCCHEGGIANO MINE.

ITALY

See Montecatini; Società Anonima delle Minière di.

BODELON i CIA.; FELIPE.

CHILE

Works office: Cajon de Los Angeles, Cabildo, Aconcagua, Chile. Owns 2 smelters, known as Los Angeles and Fundiciones Unidas, formerly owned by Sociedad Española de Fundición de Los Angeles. The Angeles smelter, 25 kilometers from Cabildo, has 3 small water-jacket blast furnaces, blower, 60-h. p. boiler, 40-h. p. Robey engine and Tangye pumps for water jackets. The Fundiciones Unidas have 2 cylindrical Harnecker water-jacket blast furnaces. About 60 men are employed at both plants. Coke costs 86 pesos per metric ton and freight on ore, 8 pesos per ton. Production, 1907, was 696,650 lbs. fine copper, of which Los Angeles smelter produced 370,372 lbs. and the Fundiciones Unidas smelted 3,433 metric tons of ore averaging 4.79% copper, yielding 295,998 kgs. of 50% matte carrying 326,278 lbs. fine copper.

BODENMAIS; KÖNIGL. BERG- UND HÜTTENAMT.

GERMANY

Office and mine: Bodenmais, Bavaria, Germany. Bergmeister A. Maurer, mgr. Property shows gneiss and granite, carrying 2 contact orebodies with northwest strike and dip of 30 to 50°. Ore is very lean, being slightly cupriferous pyrite, of only about 0.3% average copper tenor. Mine, 1 mile from Bodenmais, discovered A. D. 1463, has 2,000 meters of workings. Equipment includes a 450-h. p. electric power plant and a 40-metric ton mill having a crusher of the Pendelmühle type, 5 Humboldt jigs, 4 Humboldt tables and 1 slime table. Yearly production is about 2,000 tons of iron oxide, 150 metric tons of copperas and a smaller quantity of cupriferous copper sulphate.

BOGAN RIVER COPPER MG. CO., N. L.

NEW SOUTH WALES

Secretary, J. M. Rees, Castlereagh St., Coonamble, N. S. W., Australia. Mine office: Tottenham, via Dandaloo, N. S. W., Australia. Geo. Eason, chairman and managing director; C. Mooy, Jas. Wallace, Dr. Bertram and W. M. Keogh, directors; H. Ernest A. Miller, agt., Sydney, N. S. W.; J. Kennemore, supt.; J. Hudson, smelter supt. Organized Jan., 1906, under laws of New South Wales, capitalization £6,250, shares 2s. 6d. par, in 25,000 shares full-paid and 25,000 contributing shares paid up to 2s per share. Stock is listed on Sydney Stock Exchange.

Lands, 80 acres, leasehold from the crown, at annual rental of 5s. per acre, well timbered, formerly known as the Royal Sweep mine, opened Feb., 1906, on the Bogan river, about 20 miles from Dandaloo, in the Orange Plains district. Property is 45 miles west of Trangie, railway station on the Great Western line, and about 35 miles from Tullamore on the south. Property shows 1 lenticular orebody of 3 to 20' width, in epidote bearing mica-schist, outcropping for about 500', carrying ferruginous carbonate ore near surface and sulphides at depth, some of the carbonate stopes showing high-grade ore. The sulphide ore is too basic for successful reverberatory practice, although adapted to blast-furnace work, but latter cannot be used owing to present lack of transportation facilities and inability to secure coal or coke at a living price. Returns from upwards of 100 tons, shipped to the Waratah smelter, were 35% copper, 2.5 oz. silver and 3 dwts. gold per long ton, and 560 long tons smelted yielded 28 tons of blister copper, or exactly 5%.

Development is by shafts of No. 1, 260'; No. 2, 120'; No. 3, 80'. Mine is said to have about 320' of underground work, blocking out 2,000 tons of ore carrying 5 to 7% copper, 1 oz. silver and 72 cts. gold per ton.

Equipment includes a hoist good for 800' depth and storage tanks of 1,000 and 5,000 sq. yds. area. There is a 600' aerial tram from the main shaft to the smelter. Mining costs were \$3.60 per ton in 1910 and smelting \$8.35; about 80 men were employed.

The smelter, blown in Feb., 1908, has 2 reverberatory furnaces, each of 10-tons daily capacity, one 12x23' with a 60' stack. Sulphide ores are heap-roasted, rendering them practically self-fluxing. Fuel is wood, found in abundance nearby, costing 4s. 9d. per ton delivered, 40 tons being required to make 1 ton of blister copper. Freight charges, by wagon and rail, to Sydney, are about £4 per ton for copper. Cost, first half of 1911, was estimated at £35 per long ton for finished copper delivered in Sydney. Production, 1906, was 124,440 lbs. fine copper, and 1909 was 500,000 lbs. Option was held, 1911, on this property by Blayne Copper Mines & Smelting Co., N. L. Inactive since May, 1912.

BOGOSLOVSK; SOCIÉTÉ MINIÈRE DE.

RUSSIA

Office: Teatralnaya 18, St. Petersburg, Russia. Mine and works office: Bogoslovsk, Verkhotsorsky, Perm, Russia. A. Polow, pres.; B. Savitzky, gen. mgr.; N. Lessig, mine supt.; R. Davey, smelter supt.; C. Stutzer, asst. supt. Becoming embarrassed, the corporation was placed in the hands of trustees, Nov., 1905, to Dec., 1912. Company reorganized, 1912, with co-operation of the Azoff Don bank. Capitalization \$10,000,000; shares listed on St. Petersburg Bourse. Company's report for 1912 shows a gross revenue of 18,826,144 rubles and a net profit, including 309,615 rubles from operation of the Bogoslovsk railway, of 2,252,650 rubles, an increase over the profits estimated.

The property is one of the largest estates in the world, having an area of 3,600 sq. miles, with an extreme length of 144 miles north and south, and an extreme width of 63 miles east and west, the town of Bogoslovsk lying near the center. There also are a few hundred thousand acres of scattering lands, outside of the main estate, which has a population of about 35,000. The property includes immense forests. Mineral values include gold, platinum, copper, manganese, iron, chromium and some valuable lignite deposits. Placer gold deposits are worked by dredges and sluice work, the output, formerly 10,000 to 12,000 oz. of gold yearly, having decreased latterly.

The principal business of the company is the manufacture of iron, the output being about 75,000 tons of finished products yearly. The iron mines carry mainly magnetite, with some hematite near surface, and extraction is principally from open pits and surface cuts, at average cost of about \$1 per metric ton of ore. The property includes iron furnaces, iron and steel foundries, a steel rolling mill, coke ovens, quarries, chemical works and a flouring mill.

About one-half the company's profit is derived from copper mining, the copper mines lying in the lower rolling foothills of the Siberian slope of the Urals, the copper deposits apparently running parallel with the axis of the mountain range. The copper mines are in 4 groups, within a radius of 3 miles, the principal properties being the Bogoslovsky, Vasilevsky, Florovsky, Nikitinsky, Nikolopodgorny and Bashmakovsky mines, producers of importance in order named, and smaller mines. Country rock is limestone, of lower Devonian age, with eruptive granite and porphyry, mingled with tuffs, these being overlaid by tentaculite slate, followed by an eruption of augite-garnet rock. The copper ores occur along the contact of augite-garnet with other formations, being in lenticular shoots, mainly between diorite and wollastonite-limestone. There are some oxidized ores, but values are mainly in chalcopyrite and occasional chalcocite,

associated with ferruginous material, mainly pyrrhotite, with calcite, quartz and wollastonite gangue. The rock in the mines is extremely hard. The 4 principal copper mines have been worked for upwards of a century.

The Bogoslovsky mine, employing, 1912, an average of 844 hands, has a main lens about 1,500x600x14', and another lens about 1,575x300x10½', both worked out to a large extent. The mine is 630' deep with 1 main shaft. Ore is hand-sorted and during 1912, 40,978 metric tons were shipped averaging 5.86% copper, at a mining cost of \$4.96 per ton. Reserves estimated at 82,000 tons of similar grade and 73,770 tons low-grade ore, half of which is standing in the mine and averaging 2¼% copper, and half on the dump averaging 1%. A 25-ton Murex magnetic plant is being constructed for experimental purposes to treat the low-grade ore of this and other properties. Equipment, a 364-h. p. steam plant, including a 98-h. p. hoist and a 20-drill air compressor.

The Vasilevsky mine, employing, 1912, an average of 290 men, has numerous orebodies of varying and irregular dimensions. Main shaft, 791' deep. During 1912, 7,611 tons sorted ore were shipped, averaging 12.95% metric tons of about above grade. Equipment, a 272-h. p. electric plant, electricity generated by steam, includes 2 electrically-driven hoists of 88-h. p., compressor for 6 drills and centrifugal pumps of 160 h. p. combined.

The Florovsky mine, employing, 1912, an average of 453 hands, works 3 oreshoots, the first 105' long and 14' wide, second 119' long and 14' wide, third 140' long and 16' wide, all continuing to the present lowest level. Depth of main shaft, 917'. During 1912, 12,023 metric tons sorted ore was shipped averaging 7.75% copper, at a mining cost of \$10.60 per ton. Reserves estimated at 20,800 tons of above grade. Equipment, 335-h. p. steam plant, including a 100-h. p. hoist and a 16-drill compressor.

The Nikitinsky mine, employing, 1912, an average of 203 hands, has numerous orebodies of varying and irregular dimensions. Depth of main shaft, 644'. Shipped, 1912, 7,257 tons sorted ore averaging 11.38% copper, at a mining cost of \$9.28 per ton. Reserves, approximately 16,400 tons. Equipment, a 113-h. p. steam plant, including a 35-h. p. hoist and a 6-drill air compressor.

The Nikolopodgornyy mine, employing 79 hands, 1912, has an orebody of 245' length and 10' average width, opened by a shaft to depth of 280' and continuing below this level. Shipment, 1912, 5,410 metric tons of ore, averaging 2.04% copper and containing about \$30 gold per ton of copper, at a mining cost of \$2.70 per ton. Reserves estimated about 41,000 tons of same grade. After completion of the Murex plant production of this property will be increased. Equipment, a 32-h. p. steam plant for hoisting and pumping.

The Bashmakovsky mine, whose main shaft is 490' deep, employed 151 hands, 1912, and shipped 1,197 metric tons, averaging 5.57% copper at a mining cost of \$39.28 per ton. Main shaft, 490' deep. Equipment, a 187-h. p. steam plant, including a 37-h. p. hoist and a 12-drill compressor. This mine is now closed down.

The Auerbach mine has an average output of 1,500 tons a year of magnetite ore, carrying 3% copper.

The company is carrying on extensive development work in all mines except the last 2, also diamond drilling, and is prospecting its extensive mineral lands in order to locate new orebodies. About \$140,000 will be spent for this purpose during 1913. The mines were discovered about 1750 and have been worked since 1760, passing from government to private ownership in 1876.

The total production for 1912 was 77,000 long tons of ore averaging 6%

copper. Total power at copper mines of company, 1,300 h. p., with 7 hoists, aggregating 370 h. p., and 5 Rand and Flotman compressors of 430 aggregate h. p., operating 77 Flotman air drills.

The smelting plant, situated at Turinsky Rudnik, 8 miles from the mines, started in 1885, is now being remodeled. It has a daily capacity of 700 tons. The ore is received by rail in 10-ton side-tipping cars, dumping into a series of 500-ton stalls. The fines are sintered in pots together with flue dust.

The smelter is equipped with 2 Allis-Chalmers blast furnaces, of 200 and 500 tons per day capacity, and 4 refining furnaces of brick, handling 40 tons daily. Has 3 horizontal type Manhes converters, each 90x150". A modern plant is being built, 1913. Product is a matte of 35% copper tenor, slags averaging 0.28%. Matte is converted to blister copper of 98.5% copper, carrying 13 oz. silver and 0.30 oz. gold per ton. It is of exceptionally high quality and marketed as B. S. ingot copper. The slag is granulated and averages 0.28% copper.

The works include an acid plant, with a daily capacity of about 6,500 kgs. of chamber acid of 50° Beaumé. There also is a plant turning out about 750,000 kgs. yearly of potassium and sodium bichromate.

Fuel at the mines includes 37,000 tons of lignite, costing 72 cts. per ton; 4,200 cords wood at \$2.42. The smelter uses 16,400 tons lignite and 5,000 gal. gasoline. Coke from England costs \$13.31 per ton. An electric plant at the Florovsky mine supplies power for pumping and lighting.

Buildings include a large number of dwellings, with good structures for the chief officials, bunk houses at a number of the mines, and mainly log houses for workmen with families. The management spends money liberally, in a variety of ways, and for many purposes other than of a purely business nature, maintaining roads, schools, a mining college, geological museum and an old people's home, and furnishing free medicines, medical attendance and hospital service to the employees.

The company owns 130 versts, or about 100 miles, of narrow-gauge railway, and maintains a fleet of 10 steamers, of 21,000 tons capacity, and 54 barges and boats with an aggregate capacity of 41,000 tons.

Manual labor is done mainly by Tartars, from the province of Kazan, on the Volga, which labor is good, though poorly trained and somewhat erratic, the men usually staying a few months only. No women work underground, though employed in sorting ore, driving carts and working in the placer mines. Wages are the equivalent of 43 cts. per day for shaftmen; 38 cts. for miners, 30 cts. for mine helpers, 35 cts. per 12-hour day for day laborers, and 15 cts. per day for women day laborers.

For 1912, costs per short ton, averaged as follows: Mining, \$7.00; hand-sorting, 31 cts.; smelting, \$3.58; management, 35 cts., administration and miscellaneous, 95 cts.; a total of \$12.19 per ton of ore, equivalent to a cost of 8.6 cts., per pound of fine copper.

Present output of all copper mines is 77,000 metric tons of ore yearly. Production was 10,118,718 lbs. fine copper in 1908; 8,636,098 lbs. in 1909; 9,590,010 lbs. in 1911 and 10,251,390 lbs. in 1912. Estimated production for 1913 is 4,200 metric tons at an average cost of about \$174 per ton. Management has an experimental Murex magnetic plant, treating 25 tons per day and plans installing a new bessemer and electrolytic plants. Management capable, energetic and property has splendid future.

BOLIVIA; COMPANIA CUPRIFERA DE.

BOLIVIA

Sr. Manual Trual, owner. Mine, 268 hectares, located in the Cerro Cobrizas in San Cristobal Canton, province of Nor Lipez. Idle, Dec., 1912.

BONMAHON COPPER MINES DEV. SYND., LTD.**IRELAND**

Address; P. O., Bonmahon, County Waterford, Ireland. Sir Jas. Aloysius Power, late chairman, Tramore Co., Waterford, Ireland; H. J. Dixon, sec.; Arthur Llewellyn Pearce, cons. engr.; Herbert T. Marks, mine mgr. Organized Nov. 16, 1905, under laws of Great Britain, capitalization £30,000, shares £1 par. Letters to London office unclaimed.

Lands, 190 acres, on Bonmahon bay, 17 miles from Waterford, Ireland, include the Knockmahon and Tankardstown mines, which in 1827-65, under the ownership of the Mining Company of Ireland, made an authenticated production of £1,339,232, with claimed profits of £534,011. Ore extracted during this period is said to have averaged 10% but must have been secured by very careful hand-selection. After 1875, under a different management, mines are said to have produced about £900,000 worth of ore. The Bonmahon mines are very ancient, having been worked as early as the sixteenth century.

The Knockmahon orebody, said to be traceable 5 miles, to, Kilmackthomas, occurs in clay-slates. Annual production was about 1,000 tons fine copper, 1840. The Tankardstown mine, running under the sea for some distance, is said to show considerable bodies of ore of concentrating grade. The Bonivy mine, 300' deep, has been unwatered. Property as a whole shows large reserves of low to medium grade ores and is considered decidedly promising, but to be profitable must be operated on a large scale. At last accounts, 1908, company planned reorganization, on a basis of about £200,000 capitalization. Idle several years. Reported to have been taken up by a syndicate headed by John D. Ryan, of New York city and Butte, Mont., and to be reopened.

BONNIE DUNDEE MNG. CO., N. L.**NEW SOUTH WALES**

Office: Nyngan, N. S. W., Australia. Mine in Cobar mining district, Parish Trenton, Canbelego Co., N. S. W. J. A. Draper, chairman; A. J. L. Flashman, E. B. Treatt and R. A. Sorenson, directors. Organized 1907. In April, 1912, issued £5,000 first mortgage 10% debenture bonds, with 1 fully-paid share of stock for each £1 bond. The money is for the erection of a smelter. Mine is an old one with extensive workings. The ore has been stoped out above the 250' level. Reports by J. Polkinghorne and C. R. Mackenzie show 27,000 tons developed, carrying 3½% ore of very basic composition, adaptable to pyritic smelting. Vein on 500' level averages 6' in width and 4% copper.

BOOLBOONDA COPPER SYN., LTD.**QUEENSLAND**

Office: 13 Frederick St., Edinburgh, Scotland. Mine office: Boolboonda, Bowen Co., Mount Perry district, Queensland, Australia. A. J. H. Kenney, mgr. Organized July 19, 1909, under laws of Great Britain, capitalization £12,000, shares £1 par. In hands of liquidator, March, 1913, with a view to reconstruction. Property, 360 acres, known as the Madeleine mine, 1 mile from Boolboonda, also the Pansy mine, acquired July, 1909, and a 25-acre smelter site, 2 miles from the mine.

The Madeleine mine (M. L. 54) had 5 tunnels in 1910; No. 1, 287' on vein, crosscut at 224' driven 168' to another vein; No. 2, 312' on lode with 100' air shaft; No. 3, 250' and No. 4, 285' on vein, showing 18" of 10% copper ore; No. 5 tunnel, 195' to meet crosscut from No. 1.

BOPPY BROKEN HILL COPPER MINE, N. L. NEW SOUTH WALES

Mine office: Cobar, Bobinson Co., N. S. W., Australia. Organized, Dec., 1907, under laws of New South Wales, capitalization £22,500, shares £5 par. Mine has a 200' shaft, showing, at bottom, ore estimated to average 30% copper. Idle several years and apparently moribund, as company is unknown to postmaster at Cobar.

BOR: COMPAGNIE FRANCAISE DES MINES DE.**SERVIA**

Office: 60 Rue de la Victoire, Paris, France. Mine and work office: Bor, Arrond. de Zayetchar, Dept. du Timok, Servia. P. Mirabaud, pres.; L. Molineaux, vice-pres.; preceding officers, A. Mirabaud and G. Mirabaud, directors; A. Laurens, mgr. Organized June 24, 1904, under laws of France, capitalization f5,500,000, increased, 1908, to f7,000,000, shares f500 par. Annual meeting, Nov. 16.

Lands, a 50-year concession with privilege of renewal, known as the St. George, covering 2,400 hectares and a lease of 6,500 hectares additional lands in the communes of Bor, Krivelj and Ostrelj, lying 15 miles south of Majdenpek. The Bor deposits are on a volcanic plateau, about 1,500' above sea level, surrounded by hills 800 to 3,000' high, of Cretaceous limestone. The little villages of the plateau Bor, Zlot, Metovnica, etc., give their names to the deposits. Property shows prominent gossans carrying considerable limonite, ores occurring in a belt of 1 to 2 miles width by about 10 miles length, in fissure veins up to 50' and even 100' width, traversing andesite and volcanic tuffs and breccias. Ores include, chalcocite, covellite, bornite, chalcopyrite, enargite and chalcantite, latter in considerable quantities, associated with galena, sphalerite and pyrite, all slightly auriferous and argentiferous. At Krivelj, a vein of about 40' width gives average ores of 5.5% copper. The Tehoka Dhulkan mine, the principal producer of the company works a vein of 27 meters extreme width, which has given average assays of 6% copper. This mine produced 107,871 tons of ore in 1911 and 126,937 metric tons in 1912. At Crveno-Brdo there are 3 irregular chimneys averaging 80' in width, giving average returns of 7% copper. Property is served by a branch of the Budapest & Constantinople railway. Company is the principal copper producer of the Balkans.

The smelter has 4 water-jacket blast furnaces, two of 110 ton, and two of 210 ton daily capacity and a converter department with 1 stand and 4 shells. The steam plant has 360 h. p. Babcock & Wilcox boilers. The smelting works ran 1912, but the Servian army took nearly all the employees for the Balkan war, in the latter part of 1912 and only 1 small furnace is now operated.

Production was 2,689,612 lbs. fine copper in 1907; 4,188,740 lbs. in 1908; 12,795,498 lbs. in 1911 and 16,699,845 lbs. in 1912. The result of operations of company for 1911-12 was very satisfactory, the net profit being £208,324, an income of £90,185 over that of the preceding year.

BOSCASWELL UNITED TIN & COPPER MINES, LTD. ENGLAND

Office: 8 Old Jewry, London, E. C., England. Mine office: St. Just, Cornwall, England. A. H. Walter, sec.; Douglas S. S. Stuart, mgr. Organized June 4, 1907, under laws of Great Britain, capitalization £200,000, shares £1 par; all shares issued and fully paid, including 199,793 credited as fully paid. There are £24,000 debentures created May 9, 1912; £12,100 are issued. Of this amount £10,000 were issued at 50% discount and £2,100 at 15% discount. The company was promoted by the vendors of the mining lands, the Cornish Finance Syndicate, Ltd. Company has a lease of the mineral rights of 7 mineral setts, amounting to 600 acres, including the North Boscawell, Pendeen Consols, Boscawell Downs, Carlartha, Calartha Common and Bortherras mines, adjoining the Levant and near the Botallack, about 2 miles from St. Just. Some of these mines were worked profitably in olden days, but no work was done thereon for many years, until taken over, 1906, by Mr. Stuart. On the Pendeen Consols sett, the 135' level shows a vein carrying a 2' hanging wall paystreak of massive gray copper and chalcopyrite, the footwall showing native cop-

per, and assay of the entire vein, 1910, gave 14.3% copper and 40.6 lbs. of tin oxide per long ton.

BOSSMO; SOCIÉTÉ ANONYME PYRITES DE.

NORWAY

Office: 1 Rue d'Arenberg, Antwerp; Belgium. Mine office: Baasmoen, Mo, i Ranen, Tromsø, Norway. Oscar W. Rennert, pres.; Chr. Scheidt, G. Martens and H. Fasting, directors; J. H. Döhl and F. M. Munster, mine supts. Organized July 1, 1897, under laws of Belgium, capitalization f1,500,000, shares f500 par, reduced subsequently to f400 par; capital f1,200,000, divided into 3,000 shares, 1,000 preferred. Has paid 6% on preferred and 5% on common stock in 1911 and 1912. Annual meeting, first Tuesday in May.

Property is a mine of slightly cupriferous pyrite, assaying 0.5% and upwards in copper, and about 50% sulphur, latter element furnishing the principal ore values. Employs an average force of 220 men. Production since 1907 has been about 23,500 metric tons annually of cupriferous pyrite.

BOTALLACK, LIMITED.

ENGLAND

G. A. Scott, 5 Great Winchester St., London, England, sec.; J. Poore, chairman; Lieut.-Gen. Sir R. Pole-Carew, K. C. B. C. V. O.; R. A. Poore, D. S. O., and W. Towne, directors. Organized March 17, 1911, as a reconstruction of Botallack Mines, Ltd., capitalization £100,000, shares £1 par; 97,230 shares issued, including 39,759 credited fully paid; £23,250 (part of £30,000) 6% debentures. Is a tin-mining company, producing copper ore as a byproduct. Owns 4 tin setts, or leases, 650 acres in parish St. Just, 7 miles west of Penzance, Cornwall.

Mine workings comprise Old shaft, 1,047' deep, New main shaft 1,478', Crown shaft 648'. Has extensive workings on a network of veins that changed from predominant copper to tin when openings passed downward from slate into granite. Produced copper ore to value of £220,701 in years 1836 to 1895.

BOULDER BLOCK COPPER MINE.

SOUTH AUSTRALIA

Address: P. O. Mochatoona Springs, South Australia. Mine. 2 miles northeast of Mochatoona, shows 3 veins. Main vein has 4' average width, but is 10' wide in places and averages 4% copper in stope on 50' level, ore occurring as chalcopyrite in siderite and calcite, encased in slate. Developed by 50' shaft with 31' drift.

BOU-THALEB; SOCIÉTÉ DES MINES DU.

ALGERIA

Office: 27 Rue Lafitte, Paris, France. Mine office: Rovigo, Alger, Algeria. Jules de Catelin, mgr. Lands, 394 hectares, carrying copper, lead and zinc sulphides.

BOWER'S RANDFONTEIN, LTD.

TRANSSVAAL

Secretary, O. G. Browne, Alderman's House, Bishopgate, London, E. C., England. Mine office: care Hallett Bros., cons. engrs., P. O. Box 202, Johannesburg, Transvaal. A. G. Taylor-Hallett, managing director; S. A. Cobbett, director. Organized Feb. 7, 1905; capitalization £100,000, shares £1 par; 97,507 shares issued and fully paid. Paid £66,000 net for properties, vendors returning £24,000 for working capital out of purchase price of £90,000, in fully paid shares. Account submitted June 21, 1911, showed cash £2,364, investment £1,917.

Property consists of Gungunhana copper mine, Barberton district, Transvaal; 1,000 acres in Witfontein extension of Main Reef, West Rand, 42 claims adjoining Sheba mine, Lydenburg district, and shares in various companies.

BRADEN COPPER CO.

CHILE

G. F. Hilton, sec., 165 Broadway, New York. Mine office: La Junta, Rancagua, O'Higgins, Chile. Barton Sewell, pres.; Stephen Birch, vice-

pres.; C. K. Lipman, treas.; preceding officers, Murry Guggenheim, Wm. Braden, Eugene Meyer, Jr., Messmore Kendall, J. E. Ramberger, Pope Yeatman and Edgar Newhouse, directors; Pope Yeatman, cons. engr.; R. T. White, gen. mgr.; Robert Marsh, Jr., mine supt.; J. K. MacGowan, purch. agt.; E. T. Stannard, mill supt.; B. F. Colley, smelter supt. Organized June 18, 1904, under laws of Maine, and name changed to present title, Aug. 9, 1904, capitalization \$2,332,030, shares \$10 par, nonassessable; fully issued. Company is protocolized in Chile. Is controlled, through ownership of entire stock issue, by Braden Copper Mines Co. Has a \$4,000,000 issue of 6% first-mortgage convertible bonds. Annual meeting, 4th Tuesday in July.

Property, 101 claims, about 1,124 acres, including a 204-acre mill site at La Junta, in the province of O'Higgins, Chile. Mines are reached from Valparaiso by the Chilean State railroad, 158 miles to Rancagua and from that point by company's narrow-gauge railway, 43 miles, to the smelter and mill and 1½ miles farther to the mines. The elevation is 7,700 to 9,000', the mines being in a very rugged region on a part of the main range of the Andes. Holdings include the El Teniente mine, an antigua, La Fortuna and La Capitana mines, in the Cordillera de Graneras.

All the rocks are igneous and the rock at the mine is an andesite surrounding a body of tuff, which represents the old crater of a volcano. This light gray tuff is no longer loose and friable, but cemented into a hard concrete-like mass. The ore deposit is unique, being a volcanic vent of nearly circular section 4,000' across and filled by tuff and an agglomerate of rounded boulders of all sizes. The crater rim is surrounded by highly fractured and brecciated andesite, the fractures being mineralized around the circumference. The ore zone has been further fractured by porphyry dikes, which occasionally cut into the tuff.

The orebodies occur around, but outside the rim of the crater, in the andesite at, or near, its contact with the tuff. The ore consists of shattered andesite, often finely brecciated near the tuff contact, the copper minerals filling the cracks and openings. The orebodies are limited on one side by the tuff, but in the andesite the grade becomes lower, passing from breccia to fractured rock and fading out in the more, blocky country rock. The fractures in the rock range from a mere film of sulphide ore up to 3 to 4" of mixed bornite and chalcopryrite, mainly the latter. The orebodies dip at 70° toward the center of the crater. Three orebodies, the Fortuna, Teniente and Fortuna No. 4 are worked, with 5 others, not yet prospected. All are marked by strong outcrop stained with copper minerals. The zone of oxidation is shallow, ranging from a few feet to 150' in depth, and as the property carries mainly disseminated ore, the management holds to the belief, with strong reason, that values will carry to great depth.

The Fortuna orebody is typical of all the deposits. It is lens-shaped in horizontal section, is developed for 3,000' in length and has a maximum width of 260' and an unknown depth. The lowest tunnel, No. 4, is 1,425' below the outcrop. The copper occurs as bornite and chalcopryrite, associated with ankerite and quartz. The Fortuna mine is the principal property in point of development, this and the other mines of the company hav-

BRADEN COPPER CO.

We have been active dealers in this stock since it was brought out.

Branch:
7 Great Winchester St.,
London, England.

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ing, according to Mr. Yeatman's report of June, 1913, fully developed reserves of 44,000,000 tons of ore averaging 2.65% copper with 60,000,000 tons probable ore of 2½% grade. Mine is opened by 5 tunnels, No. 4, the deepest, being 730' below No. 3, the former lowest working, and shows copper ore of good grade at this depth for a distance of 3,000'. The Fortuna was gophered extensively, by former owners, for high-grade ore, which was followed and extracted wherever found. Average grade of Fortuna ore is lower than in El Teniente mine. Workings show copper sulphides and occluded lower than in El Teniente mine. Workings show copper sulphides and occasional metallic copper throughout the brecciated material for depth of 2,000'.

The Teniente orebody whose outcrop is supposed to be in the crater of the old volcano, shows high-grade ore at the surface in bunches and stringers. The mine is explored by an old shaft and by the No. 1 Teniente adit, 460' below the outcrop. This is the most important development at the mine, being in ore for several thousand feet with the face of the tunnel 1,400' below the surface. The ore exposed by the new work of July and August, 1913, averaged 4.4% copper for 236'. It is planned to extend this and No. 2 Fortuna level along the tuft contact entirely around the crater, 2½ miles. The Teniente is the oldest mine of the district, having been worked by the Spaniards for the high-grade ore in the small veins.

La Capitana mine, in the Cañon Diablo, on the opposite side of the mountain from the Fortuna, is to be developed through the Fortuna tunnels, at considerable depth, and is practically a part of La Fortuna mine.

Electric power is used throughout. The old hydro-electric plant, near El Teniente mine, 72 kilometers from Rancagua, takes water from 2 small cordilleran rivers, La Coya and El Teniente, through a 20x36" wooden flume, of 2 kilometers length, leading to a power house having 3 turbines, 2 developing about 1,000 h. p., and the third actuating a 175-kw. 3-phase General Electric dynamo. The new hydro-electric plant takes water through the Cachapoal ditch from the same rivers, the first unit developing 6,000 kw., with an ultimate capacity estimated at 12,000 to 15,000 kw. Cost of hydro-electric power for first year of operation was under \$2 per h. p. year, not including the interest and depreciation. Power is delivered to smelter over a line about 18 miles long, at a voltage of 33,000.

Ore is transported from mines to mills by three Riblet aerial trams, of 2,630 meters length, with 550 meters drop. The main line, of 2,000 meters length, runs from the mill to the central transfer station, where connection is had with a 1,000-meter line to El Teniente mine and a 500-meter line to La Fortuna mine. Capacity of the aerial tram system is 1,000 tons daily. An electric tram line covered with snow sheds its entire length, owing to drifting snow and numerous snowslides, handles the balance of the tonnage.

There are two separate concentration plants. The old mill, built in 1906, of 250 tons capacity, was planned as the first unit of a 500-ton mill, and was remodeled and capacity increased, 1911, to 450 tons daily. Equipment includes Hartz jigs, Overstrom and Wilfley tables, Frue vanners, Wilfley slimers and the Sherman slime-settling system. The mill yields concentrates of about 25% average copper tenor.

The new concentrators, now complete, have 3 units of 533 tons each; the coarse ore goes from bins to gyratory crushers, to two 48" rolls and six 36" rolls, with 15" face and thence to 4,000-ton fine ore bins for delivery to mill itself. Concentration is effected by 2 sets of 2-compartment Woodbury jigs, five 2½ mm. Trommels, Wilfley tables, Hardinge mills, Yeatman classifiers, 8 conical settling tanks, 8 Wilfley tables, 16 conical settling tanks, 12 vanners, automatic samplers for concentrate and tails and storage bins.

The experimental Minerals Separation Co.'s flotation plant, with a daily capacity of 240 tons, has been in operation since the fall of 1912. It proved

so successful that a 3,000-ton plant, to treat the entire mine output, was ordered and is expected to be in operation by end of 1913. The average extraction in the flotation plant has been about: 74½% in February, 71½% in March, 69.8% in April, though the guaranteed recovery of 85% will be achieved when these trial runs are completed.

The leaching plant at the mine has not been enlarged, pending the solution of problems connected with the concentration of the ore, as the mine, concentrator and flotation plant have taxed the present capacity of the power plant. A new power unit being completed, a test run of the leaching plant will soon be made. The process consists of roasting the concentrate from milling plant in Wedge furnaces and utilizing the escaping sulphurous gases to manufacture sulphuric acid in lead chambers, the resulting acid being employed in leaching the calcine. The copper sulphate solution resulting from the leaching mill will then be electrolyzed.

A smelter is now in operation at Rancagua. This plant, with blast furnaces, converters and refinery, was completed during the latter half of 1911. The complete works, including the concentrators, leaching plant and smelter, are planned to treat 3,000 tons of ore daily, estimated to average 2.65% and to yield 40,000,000 lbs. fine copper yearly, at a cost, estimated by the management, of 7½ cts. per lb., laid down in New York, with the possibility of reducing the cost to 6½ cts. per lb., if the leaching process proves adapted to treating the bulk of ore produced. Production is estimated at 3,000,000 lbs. fine copper in 1908; 7,500,000 lbs. in 1909, and 9,000,000 lbs. in 1910. Mr. Yeatman states that when the smelter construction has caught up with the mine and mill, the cost of production of copper will be below his original estimate of 7½ cts. per lb.

Production for 1912 was 9,500,000 lbs., and for the first 11 months of 1913 was 15,976,000 lbs. fine copper, or at the rate of about 16,000,000 lbs. per year, at an average cost of 7½ cts. per lb., equal to 72 cts. a share earnings with 12 ct. copper. Estimated production, when plant is increased as planned, will be 75,000,000 lbs. per year. The property is one of exceptional promise and is being developed and equipped with the aid of the best technical skill.

BRADEN COPPER MINES CO.

CHILE

Office: 165 Broadway, New York. Barton Sewell, pres.; Stephen Birch, vice-pres.; Geo. F. Hilton, second vice-pres. and sec.; C. K. Lipman, treas.; preceding officers, Eugene Meyer, Jr., Murry Guggenheim, S. R. Guggenheim, Wm. Braden, Messmore Kendall, L. F. Crofoot, J. E. Bamberger and Wm. J. Maloney (Delaware), directors. Organized May 26, 1909, under laws of Delaware, capitalization \$10,000,000, shares \$5 par, increased 1911, to \$14,000,000, shares \$5 par, nonassessable; issued \$6,000,000. Bonds \$8,000,000 authorized, \$7,000,000 issued in a \$4,000,000 issue of 10-year 6% first collateral trust convertible bonds, and an issue of \$2,000,000 second collateral trust 7% convertible bonds, of which 1,000,000 are held in trust; also 2,000,000, 3-year 7% debentures. Upon the retirement of all convertible bonds, the full capitalization of \$14,000,000 will be issued.

Property consists solely of the entire capital stock and entire bond issue of the Braden Copper Co., the Braden Copper Mines Co. being purely a holding company, controlled by the Guggenheim interests. Farmers Loan & Trust Co., New York, registrar. Annual meeting, fourth Monday in June.

BREADALBANE MG. & SM. SYN., LTD.

NEW SOUTH WALES

Office: Sydney, N. S. W. Mine: Breadalbane, N. S. W. Incorporated about Sept., 1911, in N. S. W., capital £50,000, to acquire the Breadalbane, formerly called the Cullern mine. This property consists of an area of 63 acres held as private mineral leases in parish of Midban̄g, 3 miles west of

Breadalbane township, on main Southern railway, 150 miles from Sydney. The orebody outcrops as 2 masses of ironstone, the southerly one 400' long and 100' wide. The ore occurs at the contact between a felsite dike 20' thick and slate country rock. The deposit is developed by a vertical shaft 240' deep, with levels at 170' and 240'. This work showed the orebody to be 90' wide at 170' depth and 50' wide at 240'. The ironstone was shipped for flux and the 240' shaft showed 10' of iron ore carrying 3½% copper ore along the dike contact and a second ore shoot 25' west was drifted on for 80', averaging 3.45% copper ore.

A smelting plant was erected in 1910, with 132x42' blast furnace, in which some 1,170 tons of ore was treated, 1910, but scarcity of water stopped operations. Property valuable for its iron ores with which the silicious ores of the Kangiara and Kootra mines can be smelted.

BREBO COPPER, SILVER & LEAD

MG. CO., N. L.

NEW SOUTH WALES

Office: Goulburn, N. S. W., Australia. Mine office: Brebo, Argyle Co., N. S. W., Australia. W. H. Bladwell, chairman, J. N. Hay, legal mgr., at last accounts. Lands, sundry claims 4 miles from Brebo, the nearest railway station, opened by a 60' shaft. Was developing, with a small force, 1908. Idle.

BRITANNIA COPPER MINE, LTD.

WALES

Probably dead. Last address: 16 Tokenhouse Yard, London, E. C., England. Mine at Pen-y-Pas, Carnarvonshire, Wales. See Vol. X.

BRITISH BORNEO EXPLORATION CO., LTD.

BORNEO

Secretary and offices: H. W. C. Dermer, 19 St. Swithin's Lane, London, E. C., Eng. E. Davis, chairman; K. Ettlinger, E. W. Janson, H. White and W. P. Rivett-Carnac, directors. Organized in England, Feb. 25, 1905, capitalization £500,000, in 425,000 ordinary and 75,000 founder's shares of £1 each; all issued and fully paid. The ordinary shares receive 80% of available profits, the founders taking the remainder. The company was organized to purchase from the British North Borneo Co. and the British Borneo Syndicate, Ltd., exclusive mining rights for 50 years in British North Borneo, for 100,000 fully paid founder's shares and 400,000 ordinary shares credited as 15s. paid. In April, 1908, 25,000 founder's shares were surrendered by the British North Borneo Co. and converted into ordinary shares. The accounts for year to Feb. 29, 1912, submitted July 17, 1912, showed sundry expenditures £54,751, mining expenditure £46,443, cash £22, debtors £266, creditors £3,443.

Property comprises a copper-bearing area at the Karang river, which was opened up and 80,000 tons of ore proved, but the quality was poor. A scheme of reconstruction was brought forward, Dec., 1911, but sufficient support not being received, the scheme was abandoned. Operations are now suspended.

BRITISH EXPL. OF AUSTRALASIA, LTD. WESTERN AUSTRALIA

Owned the Croydon Copper mines, 25 miles from the port of Balla-Balla. Company dissolved Sept. 27, 1912.

BRITISH PORPHYRY COPPER SYN., LTD.

NORWAY

Secretary and offices: F. F. Fuller, 638 Salisbury House, London, E. C., Eng. R. C. Richards, J. B. Whyte, T. S. Marshall, directors. Company organized Sept. 16, 1912, in England. Authorized capital £26,250 in 25,000 preferred shares of £1 each, and £25,000 ordinary shares of 1s. each; 2,502 preferred shares are issued and called up. Preference shares are entitled to a fixed cumulative dividend of 10%, and, after payment of dividends aggregating 100%, surplus profits are divided equally between both classes of shares.

Property comprises copper-mining lands at Kipperfjord, Norway, held under option by the Lawmot Syndicate, Ltd. This option was purchased for £2,250, payable £1,000 cash and £1,250 in fully-paid shares of 1s. each, also the right to March 1, 1914, to take up not exceeding 20,000 preference shares.

BRITISH SOUTH AFRICA CO.

RHODESIA

Office: 2 Lon'on Wall Bldgs., London, E. C., Eng. Information offices: 138 Strand, London, E. C., and 140 Buchanan St., Glasgow, Scotland. Duke of Abercorn, K. G., pres.; J. Rochfort-Maguire, vice-pres.; Otto Beit, P. Lytleton Gell, J. P., Sir L. S. Jameson, Bart., C. B., Hon. Sir Lewis L. Michell, C. V. O., J. Henry Birchenough, C. M. G., Marquess of Winchester, directors; Douglas E. Brodie, sec.; A. H. Ackermann, resident mg. engr. Company was incorporated Oct. 29, 1889. In Oct., 1911, the British South Africa Company's Mines Development Co., Ltd., was formed in order to develop the mining interests of the company. Present authorized capital is £9,000,000 in 9,000,000 shares of £1 each, having been increased at intervals from £1,100 in 1890; 8,056,907 shares are issued and fully paid. Bonds, £1,250 first 5% and £20,154 second-mortgage debentures.

Lands, about 400,000 sq. miles. The company acquired: (a) from the Central Search Association, Ltd., the Rudd-Rhodes Concession, consisting of the mining rights over the territory of the King of Matebeleland; the Central Search Association being entitled to one-moiety of the net receipts, which right was subsequently merged in the United Concession Co., Ltd., and capitalized in 1895 by the issue of 1,000,000 fully-paid shares of the company; (b) mining rights over the territory of the chiefs Khama and Gungunhana; (c) administrative power over the whole British sphere north of the Zambesi and west of Nyassaland; (d) rights of the African Lake Co. (acquired in 1894); (e) and also through the Victoria Power Falls Co., in which this company holds a large interest, the right to develop electrical energy at Victoria Falls.

The company adopted the name "Rhodesia" to describe all the territories under the company's administration; the portion south of the Zambesi being described as Southern Rhodesia. Company controls B'wana M'Kubwa and several other important South African copper properties by ownership of a large stock interest. Company is a gigantic corporation, which owned many copper fields and properties, some of which have been developed and floated as subsidiary corporations.

BRIXLEGG; K.K. BERG- UND HÜTTENVERWALTUNG. AUSTRIA

Mine and works office: Brixlegg, Tyrol, Austria. Gustav Kroupa, gen. mgr.; Vincens Svoboda, supt. and mg. engr.; Cayetan Hummel, smelter supt.; Josef Link, purch. agt., at last accounts. Mining lands are 22.5 hectares, carrying chalcopryite and sphalerite ores, with occasional tetrahedrite. The smelter has blast and reverberatory furnaces, argentiferous tetrahedrite and sphalerite ores being smelted separately. Matte is brought up to about 30% copper tenor, in Pilscher furnaces, there roasted in 2.1x9-meter reverberatories, in charges of 10 tons of roasted ore, 2 tons of roasted fines, 1 ton of raw fines and 1.9 tons quartz. Copper bottoms are leached with sulphuric acid, and works include a small bluestone plant. Smelter also has a refining furnace for casting anodes.

The electrolytic refinery, built 1885, was one of the earliest in existence. This has 60 tanks arranged in 6 series, electrolyte circulating in terraces and being pumped back for recirculation. Electrodes have multiple arrangement and current density is 240 amperes, or 20 amperes per square meter. The anode sludge carries about 10% copper, 10% silver, 15% zinc and 25% antimony. Product is electrolytic copper of 99.7% assay tenor.

Production is about 285,000 lbs. blister copper, 15,428 lbs. electrolytic copper and 125 tons bluestone, containing about 600,000 lbs. fine copper, 100 kgs. silver and 5 kgs. gold per year.

BRONCES; COMPAÑIA ESPLOTADORA LOS.

CHILE

Presumably dead. See Vol. X. Formerly at Los Condes, Chile.

BRONCES; SOCIEDAD MINERA DE LOS.

CHILE

Presumably dead. Letters unanswered. See Vol. X. Office and mine: La Serena, Coquimbo, Chile.

BROUGHTON COPPER CO., LTD.

ENGLAND

Works office: Widnes, Lancashire, England. Property is a small copper reduction plant.

BRUCE & CHESSOR MINING CO.

BOLIVIA

Mine office: Oruro, Bolivia. Has steam power and employs about 100 men when working, producing native copper concentrates (barilla) from conglomerate beds. Idle since the tin "boom," in 1911, led so many small operators to desert their copper claims for those of the higher priced metals.

BRUGER y CA.

BOLIVIA

Office and mine: Toledo, La Paz, Bolivia. Mine has steam power and the firm was a small producer of barilla copper. Idle in 1912, like many other producers of this region who have deserted copper for tin mining on account of the higher price and greater profit of that metal.

BRUSTAD MINES, LTD.

NORWAY

Letters unclaimed at former London office. Mine office: Eidsvold, Hedemarken, Trondhjem, Norway. G. T. Broadbridge, sec. Organized Feb. 11, 1905, under laws of Guernsey, as a second reconstruction of Golden Mint Mines, Ltd., capitalization £120,000, shares £1 par. Mine, 8 miles east of Lake Mjösen and 50 miles north of Christiania, was first worked very early in the nineteenth century. Development is by tunnel, showing a vein of 30' width, carrying copper and gold values. Has a mill with 15 stamps, 3 Frue vanners, Wilfley tables and an Elmore concentrating plant. Mine evidently has made some considerable production in the past, as evidenced by large slag piles.

BUCHANAN COPPER MINES, LTD.

QUEENSLAND

Mine office: Mungana, Lynd Co., Queensland, Australia. Lands, at Welcome creek, 15 miles west of Mungana, have but slight development. Idle several years and apparently moribund.

BUDGERY KING COPPER MG. CO.

NEW SOUTH WALES

Mine office: Hermidale, Canbelego Co., N. S. W., Australia. Organized Nov., 1907, under laws of New South Wales, capitalization £6,000, shares £5 par. No trace of operations secured and presumably idle.

BUDGERY MINES, N. L.

NEW SOUTH WALES

Office: 23 Equitable Bldgs., George St., Sydney, N. S. W., Australia. Mine office: Cobar, Robinson Co., N. S. W., Australia. M. J. Corbett, chairman; R. A. Sorensen, mgr. Organized 1906, under laws of New South Wales, capitalization £80,000, shares 10s. par. No returns secured.

Lands, leasehold, 3 miles from Hermidale, carry 6 volcanic vents, 1 under development, filled with tuff near surface, carrying, to depth of 200', cuprite in particles from pin-head to man-head size, succeeded by a large body of covellite, up to 86' width, with 45° pitch to the south, which in turn is succeeded on the bottom level, at 400', by chalcopyrite, carrying about 1.5 dwts. gold per ton in a broken formation. Company claimed, 1907, ore reserves of 40,000 tons on the 164' level. Ore produced, to end of 1906, shipped to Great Cobar works, averaged 11.5% copper. For 1907, production was 1,920 long tons of ore raised, 797 tons of dressed ore, sold for £3,695, yielding 200,000 lbs. fine copper.

In 1912 property was producing about 60 tons per week of 6 to 10% ore, a small part of which came from hand-sorting the dumps of low-grade ore, all shipped to the Cobar smelter.

BUDGERYGAR MINING CO., N. L.

NEW SOUTH WALES

Office: Nyngan, N. S. W., Australia. Mine office: Hermidale, Canbelego Co., N. S. W., Australia. Organized 1907, under laws of New South Wales, capitalization £5,000, shares 2s. par. For 1909, revenue was £2,066 4s. 4d. and expenditures were £2,055 18s. 11d., showing, according to Micawber, that the company must be prospering. Lands, on Wilga Downs, show a vein of 9 to 47' width, low-grade where widest, with kaolin gouge, carrying disseminated chalcocite, assaying 2 to 22% copper, with small gold values. Development is by 2 shafts, 200' apart, of 271' and 353'. Presumably idle. No returns secured.

BUDGERYGAR NORTH.

NEW SOUTH WALES

P./O.: Hermidale Canbelego, Division N. S. W. Property developed by 220' shaft, with workings on vein. Ninety-five tons shipped to Great Cobar smelter, 1911, yielded 12 to 24% copper, with low value in gold and silver.

BUERRERO DE VALLE HERMOSO; CIA. MINERA. ARGENTINA

Office: Santiago de Chile. Mine at Mendoza, Argentina. No trace of operations secured.

BUFFELS RIVER MINE.

NATAL

A syndicate was formed, 1905, to exploit copper deposits on the Buffels river, on the border of Natal and Zululand, S. A.

BUITRON; CIA. DEL FERROCARRIL y MINAS DEL.

SPAIN

Mine office: Zalamea la Real, Huelva, Spain. Property is operated by United Alkali Co., Ltd., under lease, and is described under title of that company.

BUNDARRA MINE.

NEW SOUTH WALES

Mine office: Bundarra, Hardinge Co., N. S. W., Australia. Max Gortler, owner; A. C. Julius, mgr., at last accounts. Lands, in the Tingha division of the Peel & Uralla mining district, show a 4 to 8' vein of sulphide ore, deepest workings being 350'. Has a smelter with a small reverberatory furnace, making 45% matte. Production, 1907, 250,000 lbs. fine copper. Employed about 50 men, 1910. No recent returns secured.

BURNIE MINES.

TASMANIA

Idle. Mine office: Cuprona, Wellington Co., Tasmania. Leigh J. Hancock, supt., at last accounts. Property formerly was owned by Burnie Copper Mines. Lands, 205 acres, partly freehold, including the town site of Cuprona, near the Blyth river. Mine, known as the Copper King, has a 155' shaft, sunk in the footwall. At 150' depth the north ore shoot had disappeared, and the south oreshoot showed decreased values. Has a fair power equipment, and employed 6 men at last accounts. A little ore shipped, 1906, to New South Wales smelters, returned 25% copper; production, 1906, was 236,880 lbs. fine copper.

BURRA BURRA COPPER MG. CO., N. L.

SOUTH AUSTRALIA

Office: Eagle Chambers, Adelaide, South Australia. Mine office: Burra Burra, Burra Co., South Australia. T. B. Gall, chairman; V. Lawrence, sec.-treas.; Wm. West, gen. mgr.; Jas. S. Pryor, supt., at last accounts. Organized 1901, under laws of South Australia, capitalization £120,000, shares £1 par, 10s. paid in; issued, £95,173.

Lands, 672 acres, freehold, with mineral rights to 11,065 acres adjoining. Mine was opened Sept., 1845, employed 1,170 men, 1859, and was closed 1877, operations, 1845-77, yielding 51,622 long tons fine copper, valued at £4,749,224. Former company paid £800,000 in dividends, on a paid-up capital of only £12,320. Ore produced in early days averaged

about 20% copper, after selection, with average output of 5,000,000 to 7,000,000 lbs. fine copper yearly.

Property shows 3 veins, with northwest trend, and dip of 70° northeast. Country rocks are limestone, argillaceous slates and argillaceous sandstones, with a footwall variously reported as serpentine and altered limestone. Property shows 3 veins, known as the Kingston, Sanders and Tinline. Development is by 5 tunnels, of 183', 300', 330', 420' and 600', and by several shafts, Morphet's, of 600', being the deepest. Ores in upper levels were cuprite, malachite, azurite and native copper, occurring in very rich but irregular bunches, the lower levels showing bornite and chalcopyrite.

The mine was reopened, 1901, by present company, but ore averaged only about 2% copper and a smelter was being built, 1907, at Kooringa, near the mines, to treat the slags from the old Burra Burra smelter, said to average 2 to 2.5% copper. Production, 1903, was about 225,000 lbs. fine copper. Has steam and electric power. Idle since 1904.

During the last copper boom the company was paid £7,250 for an option never exercised, owing to the sudden decline in the price of copper. There is now a likelihood of the old property being unwatered and an attempt made to develop the sulphide ores which old miners say exist beneath the rich bonanza ore.

BWANA M'KUBWA COPPER MINING CO., LTD.

RHODESIA

Secretary and office: T. Donald, Salisbury House, London, E. C. England. Mine office: Bwana M'Kubwa, Rhodesia. Col. C. H. Villiers, chairman; H. L. Stokes and A. Stewart, directors; Jas. Cook, gen. mgr.; T. B. McGhie, metallurgist. Organized March 16, 1910, under laws of Great Britain, capitalization £600,000, shares 10s. par; 921,847 issued; controlled by ownership of £250,000 of fully-paid vendor's stock by Rhodesia Copper Co., Ltd. March, 1910, 350,000 shares were sold for cash, of which amount British South African Co. owns 116,666 shares, and 233,334 were allotted to shareholders of Rhodesia copper & General Exploration Co., Ltd., at par, of which one-fourth was called March, 1912, and option on three quarters extended a year at 12s. 6d. per share, instead of par. In 1912, the company paid 30,000 shares and gave option until March 31, 1914, on 51,666 shares at par, for additional property. Expenses for year 1912 were £29,236. Treasury had assets £338,060, cash £90,896, June 30, 1912.

Property consists of the Bwana M'Kubwa mine, 450 claims; 6 farms in the vicinity of the mine, with total area 36,000 acres, 120 mining claims with iron deposits, the right to peg 200 mining claims in northern Rhodesia. Lands were taken over from the Rhodesia Copper Co., Ltd., which floated this company. The Bwana M'Kubwa mine is 7 miles south of the Congo border, 100 miles from Star of Congo mine. The railway crossing the property gives direct service to Beira, 1,450 miles away. The surface shows extensive remains of ancient workings extending over half a mile. Country rock is quartzite, schist and sandstone, carrying 2 parallel veins, about 15' apart, traced one-half mile, main vein being 30" to 5' in width, with average of 4', having copper impregnations for 40' in sandstone walls; such impregnations are claimed to average 4 to 5% copper. Property is developed by a 572' shaft with extensive workings on various levels, especially the 350' and 450', which show continuous ore for 2,000' along the vein. The lode is 50' wide, embracing the 2 veins noted and on the 450' level shows a central ore streak 5' wide and continuous through the workings, averaging 14% copper. Crosscuts at intervals along the drift show a total width of 50' of 5% ore. Sampling by the manager at 4 points gave 40' of 6.37% copper, 28' of 2.86% copper, 4' of 6% copper and 3½' of 5%

copper. The mine contains 50,000 tons of 12% ore proven above the 350' level and a considerable tonnage between this and the 450' level.

In 1912, shaft was deepened 23' and 1,175' drifting and 239' of winze work was done. The company has installed a 75-ton concentrating plant made by the Wilfley Machinery Co. and the first shipment of concentrates, 296 tons, was made in June, 1913. Experimental tests by the Siemens-Halske leaching treatment, with electrolytic precipitation, have proved successful and a 200-ton plant has been ordered.

An examination by S. J. Speak, July, 1913, showed that former estimates were excessive owing to porosity of ore, which is 27 cu. ft. instead of 16 cu. ft. per ton. His figures are given above. He recommended stopping water concentration, says direct smelting is impracticable, and advises development of low-grade orebodies below zone of oxidation, to prove up indicated ore.

Property considered valuable and management apparently good, but excessive railroad freights will prevent property from paying dividends until better rates are secured.

CABEZAS DEL PASTO; MINAS.

SPAIN

Owned by Sociedad Colectiva C. y J. Sundheim, at Valerde del Camino, Huelva, Spain, but leased to United Alkali Co., Ltd., and described under title of latter.

CABILDO; FUNDICIÓN DE.

CHILE

Owned by Sucesión de Cerveró, at Cabildo, La Ligua, Chile.

CACERES; BASILIO.

CHILE

See Basilio Caceres.

CADIA COPPER M. & SM. CO., LTD.

NEW SOUTH WALES

Office: Newcastle, N. S. W., Australia. Mine office: Cadia, Bathurst Co., N. S. W., Australia. Alexander Ross, chairman of board. Organized Sept., 1908, as a reconstruction of Cadia Copper Mining & Smelting Syndicate, with capitalization £120,000, shares £1 par.

Lands, held under lease from the Scottish-Australian Mining Co., Ltd., are on Cadiangulong creek, 15 miles south of Orange. Property has been a very small producer of selected ore, in the past, and had a smelter, 1888, which treated 4,000 to 5,000 tons of ore. Property carries 2 parallel veins, one, known as the Cadia or Iron Duke, of 12 to 9' width, carrying oxidized ore, with quartz gangue, up to 13% in copper tenor. Mine was estimated, 1912, to have reserves of 89,124 long tons of 7% copper ore. The 172' Chilcott shaft develops a vein of about 5' width, carrying sulphide ore, and was estimated, 1910, to have developed 1,650 long tons of 4.6% sulphide ore. Negative results were secured from 1,080' of diamond drilling, done 1910. Mine lacks rail connections, and wagonroads to Carcoar and Orange in poor condition for years, are to be rebuilt by the Canobolas Shire council. Mining development was resumed, 1912, with favorable results.

The smelter, built 1906-07, has 4 reverberatory furnaces and a second hand blast furnace bought from the Great Cobar. About 200 men are employed when working full force. Production, 1906, was 1,043,840 lbs. fine copper, and a little production was secured in 1908. The smelter resumed operations, 1913, turning out 2½ tons of 57% matte per shift. Company installed electric power, 1912.

CADIA EXTENDED MINE.

NEW SOUTH WALES

Idle. Office: Newcastle, N. S. W., Australia. Mine office: Cadia, Bathurst Co., N. S. W., Australia. Lands on Waterfall creek, about 1½ miles from Cadia, known formerly as the Little Canobolas mine, show a large outcrop of gossan. A number of shallow shafts show native copper, carbonate and sulphide ores and tetrahedrite. Formerly considerable cupri-

ferous iron ore was taken from this mine for fluxing the ores of the Cadia property. The smelter has a small water-jacket blast furnace, blown in Nov., 1909. Property considered promising.

CALA; SOCIEDAD ANONIMA MINAS DE.

SPAIN

Office: Bilbao, Spain. Mine office: Cala, Santa Olalla, Huelva, Spain. Conde de Rodas, pres.; Don Emilio Vallejo, sec. Organized Aug. 31, 1900, under laws of Spain, capitalization 15,000,000 pesetas. Property is a group of 8 mines, area 346 hectares, at Cala, carrying magnetic iron ore and cupriferous pyrite, orebodies apparently being extensive. Company is supposed to have built a 97-kilometer railroad, from the mines to San Juan del Aznalfarache, on the Guadalquivir river, in the adjoining province of Sevilla. Idle several years.

CALAMA; COMPAÑIA DE MINAS i FUNDICION DE.

CHILE

Office: L. E. Browne, Gerente, Casilla 1,155, Valparaíso, Chile. Mine office: San José del Abra, Calama, Antofagasta, Chile. Works office: Calama, Antofagasta, Chile. Organized April 16, 1903, capitalization 600,000 pesos, shares 100 pesos par, and reorganized April 31, 1903, under laws of Chile, with capitalization £250,000, shares £1 par.

Lands, 2 kilometers east of Calama and 238 kilometers from the port of Antofagasta, are in the Chilean desert, with hard living conditions and high costs for subsistence and transportation. Property includes the Rosario del Llano, San Manuel, San Gregorio and Ibacache mines, which show considerable quantities of 3% cupriferous pyrite, which can be considered as ore when a railroad is near. The Rosario del Llano mine, at Chuquicamata, is the principal producer of the district, and is opened to depth of 160 meters and for length of 200 meters.

Equipment includes a hydro-electric power installation, with a 260-h. p. turbine direct-connected to a 250-h. p. dynamo, taking water from the Rio Loa, 1 mile distant. It is planned to greatly enlarge this plant, and completely electrify the Chuquicamata properties and the smelter. There is a well-equipped machine shop, with a small iron cupola, employing about 60 men.

The mill has a crusher, No. 4 Ball mill, 2 Ferrari tables and 3 jigs, and works dry, this being considered preferable to wet concentration. Ore milled averaging about 5% copper and up to 85% silica is used for converter linings. Concentrates are briquetted.

The smelter, known as Los Chorrillos, built 1907, has 3 reverberatory calciners, a furnace for calcining limestone used for briquetting, and a new 100-ton 42x144" blast furnace having 2 series of jackets, with rectangular forehearth. Slags are hauled by mules. The converter department has no dust chamber, gases going direct to iron chimneys. There are 2 stands, with four 1.7x2.1-meter and four 1.7x2.4-meter shells, equipment including cylindrical pans and a pug mill for linings, operated electrically. Ores smelted average about 10% in copper tenor, but there is a shortage of sulphide ore, and ores smelted are both silicious and aluminous, necessitating heavy coke charges, 1 ton of coke being required for smelting 1.6 tons of charge, and the limestone used for fluxing carries much baryta. Losses are very high owing to lack of dust flues and chambers and there also are heavy losses in slags, which average about 0.5%, owing to the very refractory nature of both ores and fluxes. Smeltermen receive the high average wages of 4 pesos per day. The smelter power plant includes electric power and a producer-gas plant, with a 320-h. p. Fielding & Platt gas engine, the entire gas plant and engine costing 95,266.81 pesos. There also is a Riedler air compressor, and Nos. 6 and 7 Wilbraham-Green rotary blowers. Production was 1,717,035 lbs. fine copper in 1903; 3,480,085 lbs.

in 1907; 3,030,413 lbs. in 1908, and 3,000,000 lbs. in 1909. The property is well handled, despite a number of serious drawbacks. Employed 200 men, and was producing 1,000 long tons ore monthly, averaging about 13% copper, at last accounts, March, 1913. Mr. Browne writes in August that "we are just organizing the works on the mine and smelter and for this reason are not yet prepared to make any report on the properties."

CALCANTE MINES.

ITALY

Mine office: Traves, Torino, Italy, Giulio Elter, owner. Property, in the western Alps of Piedmont, formerly was a considerable producer of nickel, cobalt and copper, latter from chalcopryrite, found in stratified Archaean rocks. Idle several years, but is to be reopened by crosscut tunnel at last reports, June, 1913.

CALDERON; MANUEL.

BOLIVIA

Office and mine: Coro Coro, La Paz, Bolivia. Property is the San Agustin mine, worked in a primitive way, which was a small producer of native copper from conglomerate strata, some years ago.

CALVERT GOLD & COPPER CO.

NEW SOUTH WALES

Mine office: Millthorpe, Bathurst Co., N. S. W., Australia. John Mills, mine mgr., at last accounts. Lands, 100 acres, near the Cadia mine, in the Forest Reefs district, carrying a vein with northwest strike. Development is by 2 shafts, deepest 121', on a vein of about 15' width, carrying a 3' paystreak assaying up to 16% copper, 10 oz. silver and \$30 gold per long ton. A general sample of the ore at bottom of main shaft gave an assay of 12.1% copper, 5 oz. 4 dwts. silver, and 1 oz. 5 dwts. gold per long ton. Several parcels of ore shipped returned about £20 per ton net. Equipment includes a hoist. Suspended operations, early 1910, planning disposal of machinery plant and is presumably liquidated.

CAMBRIA COPPER & GOLD MINES CO.

QUEENSLAND

Office and mine: Booldoonda, Queensland, Australia. Property is a leasehold, owned by H. Saltrick, et al., showing highly auriferous copper ore. Development is by a 95' shaft. Mine was making regular, though small shipments to the Mount Perry smelter, late 1912, ore averaging about 25% copper, 15 oz. silver and \$25 gold per ton.

CAMPANARIO; SOCIÉTÉ DES MINES DE CUIVRE DE.

SPAIN

Address: Anatole Olivier, sec., 5 Rue du Helder, Paris, France. Mine office: Valverde del Camino, Huelva, Spain. Baron A. de Dietrich, chairman; Charles Chalupt, Henri Lemaitre, Max Lyon, Jules Strap, directors; Arthur Marshall, gen. mgr. Organized Dec. 20, 1906, under laws of France, capitalization f5,000,000, shares f500 par. Lands, 87 hectares, including 6 old mines, estimated by company to carry 13,000,000 metric tons of ore, and actually having about 250,000 tons of low-grade cupriferous pyrite in sight. Equipment includes an elaborate and extensive surface plant. The property produces about 30,000 tons of pyrites annually, ore being first treated by lixiviation and cementation to recover its copper content and residue sold for its sulphur.

CAMPIGLIA ESTATES, LTD.

ITALY

Secretary: J. F. Drake, 95 Cannon St., London, F. C. England. Mine office: Campiglia, Marittima, Tuscany, Italy. Sir F. J. Mirrieles, K. C. M. G. and W. B. Butler, directors. Organized July 26, 1911, capitalization £22,000, in 2,100 preferred shares and 19,900 common shares of £1 each; 1,604 shares of preferred and all common shares being issued and fully paid. Company succeeded the Etruscan Copper Estates, Ltd., of unsavory memory.

Lands, 1,500 acres, include the old Lanzi, Temporino and Rombola mines. These properties show numerous and extensive old workings, cer-

tainly as ancient as the Roman era, and probably dating back to Etruscan times. During the nineteenth century various Italian, French and English companies attempted, without success, to work these mines, which are honeycombed by ancient inclines, adits, drifts, winzes and stopes. The property was examined by C. Algernon Moreing, Edgar P. Rathbone, R. J. Frecheville, Alaxander Hill and J. H. Fawcett, all of whom reported unfavorably.

Development is by shafts, deepest being the Govett at 330'. This shaft shows extensive old workings, with little ore. The 250' Coquand shaft makes a similar showing. The Marchant shaft, about 100' deep, shows a little chalcopyrite, disseminated in pyrite, with amphibole gangue. While the property is called a copper mine, it seems the practically unanimous opinion of experienced engineers that the principal values, doubtful as these may be, are in lead and zinc, rather than in copper.

The reduction works, at Rombola, are connected by rail with the mines at Lanzi and Tempolino. The plant includes a concentrator and smelter, latter having a copper furnace of 100 tons nominal daily capacity.

CANBELEGO COPPER MINES, LTD.

NEW SOUTH WALES

Office: Cobar, N. S. W., Australia. Mine office: Hermidale, Canbelego Co., N. S. W., Australia. Organized March, 1909, capitalization £12,500, shares 5s par, as successor of Canbelego Copper Mining Co., Ltd.; issued, £5,000, fully paid. Lands carry considerable timber, available for fuel and mining use. Mine has 2 parallel veins, with aggregate reported width of about 40', showing occasional stretches of good ground, the principal vein apparently being of about 5' average width. Main shaft is 300', showing sulphide ore from which selected samples assayed 18% copper. Shipments to the Great Cobar smelter, 1910, averaged 12% copper.

Mine was shut down, July, 1911, but unwatered and reopened, June, 1912, and stoped from the 200' and 300' levels, 145 tons being shipped up to August of that year. New boilers and hoist were installed, 1912.

CANZA MINE.

PERU

Office and mine: Canza, Ica, Peru. A. Garland & Co., owners, at last accounts. Is an old property, once a considerable producer. Numerous cupriferous veins, in igneous rocks, carry bodies of ore that are oxides and carbonates above and sulphides below, 3 principal veins being opened to depths of 700' on the Adelaide, 1,000' on the Consolador, and 500' on the Tapadita, the latter mine having been the largest producer in the past. Idle several years.

CAPE COPPER CO., LTD.

CAPE PROVINCE

Secretary: P. J. Franks, 9 Queen St. Place, London, E. C., England. Mine office: O'okiep, Little Namaqualand, Cape Province; James Crozier, gen. supt. Works office: Briton Ferry, Glamorganshire, Wales. John E. Champney, chairman; John Taylor, J. M. V. Money-Kent, T. Blair Reynolds and Marcel Paisant, directors; John Taylor & Sons., mgrs; J. Crofts, chief engr.; N. E. Moffatt, traffic mgr.; H. Phillips, smelter supt.; Dr. A. de W. Allan, chief surgeon. Organized April 30, 1888, as a reconstruction of Cape Copper Mining Co., Ltd., under laws of Great Britain, capitalization £750,000, in £150,000 cumulative 6% preferred shares and £600,000 ordinary shares, par £2; issued, £690,000. Annual accounts are made up to April 30, at the Cape, and to August 31 in London, and are submitted in December. Separate accounts are kept for the Tilt Cove mine.

Profits have ranged from a net loss of £6,493 17s. 9d. in 1902, owing to interruption of business through the Boer war, this being the only year in which no profit was earned, up to the maximum profit of £379,910 in 1907, with profits of £144,366 15s. 8d. in 1908; £90,223 19s. 5d. in 1909;

£124,659 16s. 9d. in 1910; £60,862 7s. 4d. in 1911, and £180,494 in 1912, giving total net profits to Aug. 31, 1912, of £3,879,461 14s. 5d., in addition to which the Cape Copper Mining Co., Ltd., paid dividends, 1864-88, aggregating £1,324,375. The present company paid dividends to Jan. 1, 1913, of £2,868,750. Dividends, 1912, were 2s. 6d. each on preferred and ordinary shares.

The Tilt Cove mine has been abandoned by the company. This mine is the property of the Tilt Cove Copper Co., Ltd., and was held under 99-year lease of £4,400 per annum, terminated Aug. 31, 1913. Net profits of the Tilt Cove, divided equally, were £15,072 in 1911.

The company is entitled to one-half of the net profits of the Briton Ferry Chemical & Manure Co., Ltd., profits from this source being £4,340 9s. 9d. in 1911.

Principal mines of the company are in Little N maqualand, Cape Colony, lands including about 280 acres of freehold and a few leasehold tracts. The first mines were opened, 1856, by Phillips & King, and were taken over, 1860, by the predecessor of this company. Principal mines 1913, are the O'okiep, NababEEP and NababEEP North, with a number of idle mines and prospects. Ore contains chalcopyrite, with limited quantities of bornite and chalcocite, intimately associated with pyrite. These irregular deposits of massive pyritic ore are associated with basic igneous dikes, intrusive in granite and gneiss.

The O'okiep mine, long the principal mine, has dwindling ore reserves, estimated, 1912, at only 6,000 long tons, though production has remained practically unchanged for some years and was 16,986 long tons of 12.4% copper tenor in the fiscal year 1912. Production for 4 months, May to Aug., 1913, has been 2,637 tons of ore averaging 14% copper. The O'okiep East mine, showing a limited amount of low-grade ore, is idle.

The NababEEP mine, 5 to 6 miles west of O'okiep, opened 1890, includes the NababEEP South, now the principal producer, and has increasing reserves, estimated, April 30, 1912, at 130,000 tons of 5% ore, production for year ending that date being 55,970 long tons of ore assaying 5.27% copper, of which amount 10,475 tons was secured from the capping, mainly by quarrying. The mine is developed by tunnels and a shaft. Output for 1910-11, 55,202 tons, with reserves of 172,200 tons. Production for 4 months, May to Aug., 1913, was 11,458 tons of ore averaging 3.6% copper.

The NababEEP North mine, supposedly nearly worked out some years ago, for the fiscal year 1912 yielded 5,035 tons of 5.71% ore, obtained mainly from opencast workings.

The Narrap mine, about 1 mile east of the O'okiep East, with somewhat similar ore, has ore reserves estimated, 1912, at 24,000 tons of 4% copper tenor, and yielded 6,195 long tons of 4.03% ore in 1912. This property has an aerial tram, electric hoist and ore crusher. The Narrap South mine, opened to a depth of 120', is without important developments.

The Spektakel mine, 28 miles west of O'okiep, is an idle, old mine, having orebodies both in granite and basic intrusive rocks.

The Carolusberg mine, about 6 miles southeast of O'okiep, opened by tunnel, and the Carolusberg East mine, about 2 miles east of the Carolusberg, are both idle.

Other idle properties include the Flat mine, 4 miles north of NababEEP, which was reopened, 1907; the Kopperberg mine near the Carolusberg, about 5 miles southeast of O'okiep, and the Coetzee mine, which was abandoned and plant removed several years ago.

Electric power has been substituted for steam throughout the principal

works, the central power station at the O'okiep mine having 2 suction gas engines, with the old steam plant held in reserve for emergencies.

Reduction works at the mines include smelters at O'okiep and NababEEP, the former closed down 1912, the ore from both mines being treated in the enlarged NababEEP plant, 1913. Production of the smelter is matte of 48 to 50% copper tenor, shipped to the Briton Ferry works for resmelting and refining.

The company owns a 99-mile railway, with 16 miles of sidings, running from O'okiep to Port Nolloth, where there are docks, wharves, cranes, tugs and lighters for the receipt and dispatch of freight. The line is laid with 32, 37 and 50 lb. rails. Freight traffic for fiscal year ending 1912 was 92,343 long tons. The company also owns 4 tugs at Port Nolloth. A tram line connects the principal mines with the smelters.

In addition to its mines in South Africa, the company has an option on the Baie Verte mine, in Newfoundland. Properties in the United States, formerly held under option, were surrendered, 1910, but the company secured title to some claims in Alaska, on which no work is planned until a railway reaches the district.

The company has also taken a lease on the Rakha Hills, or Rajhoda property, at Surda, India, and spent £32,058 on its development. This mine shows an extensive belt of cupriferous schist, in blanket formation, with seams of copper ore of 2 to 6% tenor. Development is by several shafts, the Gladstone shaft showing a fair amount of ore of about 4% copper tenor. During 1910-12, a number of boreholes were drilled with a total of 9,700', proving the copper belt for nearly $1\frac{1}{4}$ miles. Development work to March, 1913, amounted to 10,952', blocking out ore reserves of about 190,000 tons. The main shaft 666' deep, the lower 422', an incline, shows an improvement in width and value on lowest, or 5th level, July, 1913. New work to the extent of 1,109' was done at the mine during the 3 months ending June 30. No. 4 shaft, three-fourths mile from the main workings, was sunk 87', showing 4' 3" of 5.12% copper ore; 350 tons were shipped. This property is considered promising.

The Briton Ferry smelter, which is the largest in Wales, in addition to treating the company's own ores, does a general custom business, smelting the ores of the Namaqua Copper Co., Ltd., under contract, treating 13,879 long tons of Namaqua ore and 883 tons of Namaqua matte of 54% copper tenor in 1906. The Briton Ferry works are located on the Great Western and Rhondda railways, also having canal connection with Swansea, receiving ores mainly by rail. The works have revolving cylindrical calciners up to 80' in length, heated by gas, and four 70-ton blast furnaces, making matte. Ores are smelted, without calcining, in reverberatories, to a 76% white metal, which is refined by the Nichols direct method, by which some of the white metal is calcined and mixed with uncalcined white metal, the consequent reaction eliminating the remaining sulphur. Tilt Cove sulphide ores are burned in kilns for their sulphur contents, fumes going to an acid plant, which makes 30,000 tons of chamber acid yearly. The works have a double concentric chimney of steel and concrete and a telpherage plant for handling material. In 1906 the Briton Ferry works produced the equivalent of 10,212 long tons of fine copper, of which 733 tons were turned out as bluestone, and output was increased, 1909-10. The works include an electrolytic refinery, constructed 1912.

Production of the African mines has been as follows: 8,960,000 lbs. fine copper in 1901; 6,061,000 lbs. in 1902; 10,371,200 lbs. in 1903; 12,264,000 lbs. in 1904; 11,256,000 lbs. in 1905; 8,825,600 lbs. in 1906; 9,475,200 lbs. in 1907; 10,035,200 lbs. in 1908; 10,404,800 lbs. in 1909; 9,867,200 lbs. in 1910. This output

represents about three-fourths of the company's total production, the balance coming from the Tilt Cove mine. The management has been criticized occasionally for not adopting the latest methods and machinery, but the circumstances of the case have precluded as rapid advances in this direction as would be warranted were the company mining enormous orebodies. The record of the Cape Copper Co., Ltd., as a steady dividend payer, for 40 years past, is perhaps the best answer to such criticisms, founded upon a partial misconception of the facts. The company issues full monthly reports to stockholders that are models and could be imitated by other companies to the advantage of the investor.

CAPILLITAS CONSOLIDATED MINES, LTD.

ARGENTINA

Secretary, G. Hillsdon, 579 Salisbury House, London, E. C., England. Mine office: Cerro de Capillitas, Tucuman, Argentina. Works office: Muschaca, Catamarca, Argentina. P. Viteau, gen. mgr.; B. Wolf, chairman; Jules Fribourg, E. d'Eon Jobert and Gaston Poulain, directors. Organized April 24, 1909, under laws of Great Britain, capitalization £600,000, shares £1 par; issued, £416,104, fully paid. Was a reconstruction of the Capillitas Copper Co., Ltd. Accounts to June 30, 1912, submitted Dec. 31, 1912, showed cash of £37,391, and debts of only £364, with £2,940 calls in arrears.

Property comprises the Capillitas and Atajo copper mines and the Pilciao and Constancia smelters, all in Catamarca province, Argentine Republic. The Capillitas group, of about 20 properties, in the Sierra Capillitas district of Andalgalá, shows 12 veins, principal development by original owners having been on the Restauradora, Rosalia, Carmelita, La Grande and Ortiz mines, reopened, under the former management, by 2 tunnels under the old workings of La Grande and by one tunnel in the Restauradora. The Atajo mines are 6 miles northwest of the Capillitas group. Former company claimed ore from development work averaged about 15% copper, with good gold and silver values, but the smelter returned an average of only 7% copper, 8 oz. silver and 0.7 oz. gold per long ton. These mines have been worked spasmodically by local capital since 1850. The Restauradora mine has upwards of 3 miles of workings on a vein of 18" to 6' width, ore occurring irregularly, in shoots, being mainly chalcopyrite, associated with pyrite, with considerable chalcocite and bornite.

The mines are located in an extremely rugged mountain country, necessitating former shipment of ore to smelters by pack mules, mines being 8,000' above sea level and more than 6,000' above and 33 miles from the smelting works at Pilciao. The nearest railroad station is Chumbicha, 165 kilometers distant, over exceedingly rough and dusty roads, on which a traction engine was tried, but stuck in the sand. The Argentine government promised, years ago, to extend the Córdoba Central railroad to Andalgalá, but the line failed to materialize. To cover the worst stretch between the mines and smelters, a single line aerial tram was built, 22 miles in length, with longest span of 2,765' and highest span of 625'. Plant weighs 2,000 tons and was designed to carry 40 tons of ore hourly, at a speed of 2.5 meters per second, with buckets of 500 kgs. capacity. The tramway was started April 1, 1907, but did not succeed in filling the 600-ton bins at the smelter until May, when one blast furnace was blown in, beginning semi-pyritic smelting, with 5% charcoal charges, but experiencing unusual difficulties. Much trouble was had with the tram line from buckets falling off, and, instead of a rated capacity of 150 tons daily, the maximum quantity of ore transported in 1 day was 50 tons, and the average for several months was about 15 tons daily. The tram line leaves a 20-mile gap between Pilciao and Muschaca, over which transportation is by carts.

The smelter has two 50-ton water-jacket blast furnaces, with dam, filter

and tanks, water being supplied through an 8½-kilometer pipe line. The old Constancia smelter has 2 reverberatory furnaces. The new smelter gave much trouble in operation, but was amply capable of caring for all ore the tramway could bring. First-fusion product was a 30% matte, resmelted to 50% copper tenor, which was packed and carted 120 miles over a desert to the nearest rail station.

The company was engaged in exploratory and development work, at last accounts, and was said, June, 1912, to have developed about 50,000 tons of 8% copper ore.

CAPPER PASS & SON, LTD.

ENGLAND

Office and works: Bristol, Somersetshire, England. Property is the Bedminster Smelting Works, treating ores imported from a great variety of sources.

CARAHYBA; MINAS DE COBRE DE.

BRAZIL

Mine office: Praba, Jaguarary, Bahia, Brazil. Don José Gonçalves da Silva, owner. Lands, 6,000 hectares, about 10 leagues from a railroad, on the São Francisco river. Mine was opened 1783, and is perhaps the most important copper property of Brazil, having been worked, to some extent, at intervals for many decades past and showing the ruins of an old smelter with 2 furnaces. Mine is developed to only shallow depth, pits and shafts of 3 to 90' depth showing copper oxides. Ores apparently are distributed over a large extent of territory, but depth reached has been inadequate to determine the depth of the oxidized zone, or the nature of the ores below. Property was last tested, 1902, by an English syndicate and has been idle since.

CARELLA COPPER CO.

QUEENSLAND

Owms the Rosebud mine, developed by 200' shaft, in which excessive water interfered with work in 1913.

CARIDAD COPPER MINING CO., LTD.

SPAIN

Idle. Office: 20 Lawrence Lane, Gresham St., London, E. C., England. Mine office: Lozoyuela, Madrid, Spain. Robert Summerside Simpson, chairman; preceding officer, Wm. Jeffreason Woods and Thos. Geddees, Jr., directors; Geo. Thompson, sec. Organized Feb. 15, 1899, under laws of Great Britain, capitalization increased, 1901, to £350,000, shares £1 par; issued, £75,492. Lands, 325 acres, including the Caridad, San Antonio and Descuido mines. Closed down many years and apparently moribund.

CARMEN; COMPAÑÍA MINERA DEL.

PERU

Mine office: Huarochiri, Lima, Peru. Lands, 61 pertenencias, known as El Carmen mine, developed through La Carolina and Santa Rita tunnels, working the Bella Unión vein, of about 1 meter average width, carrying argentiferous and auriferous tetrahedrite, chalcopyrite, galena and sphalerite, associated with pyrite, with quartz gangue. Property also has the Aracucana vein, of about 24" width, which is rich and is worked to some extent. Ore is shipped to the Casapalca smelter, and matte therefrom exported to Liverpool, via Callao.

CARMEN; MINAS DEL.

CHILE

Mine office: Pueblo Hundido, Chañaral, Atacama, Chile. Simon Baldieso, owner; Adriano Fernandez, mgr., at last accounts. Lands, 15 hectares, including El Carmen, Carmela, Cardúmen, Nuevo Araucana, Quíñazo, Locura, Lautaro and other mines. Property shows 2 main veins in syenite, the Veta Manto ranging 4 to 12 meters in width, with a minor vein of 2 to 3 meters width, both having north and south strike, with dip of 40°. Ore occurs in lenticular shoots, the oxidized zone, of 100 meters average depth, carrying oxides, carbonates and silicates and an abundance of native copper at approximately 200' depth in the Carmen mine, with secondary sulphides

at a vertical depth of about 110 meters, followed by chalcopyrite, associated with arsenopyrite, disseminated in a gangue of iron oxide, limestone and decomposed porphyry.

El Carmen, the principal mine, is opened by 2 shafts, 190 meters apart, sunk at an angle of 45°, to depths of 85 meters and 250 meters, the vein ranging 3 to 12 meters wide, with an average width of 5 meters. The other mines are opened by shafts. The properties, as a whole, show reserves of about 75,000 tons of ore, of 5 to 15% copper tenor. Dumps have about 7,000 metric tons of ore, of 6 to 12% copper tenor, and about 30,000 metric tons of 5% ore.

Equipment includes a good steam plant and forces are about 100 men.

CARMONA; GUILLERMO.

CHILE

Office and mine: Higuera, La Serena, Coquimbo, Chile. Property includes La Estrella de Maria, San Tomás and Santiago mines. Idle several years.

CARN BREA & TINCROFT MINES, LTD.

ENGLAND

Secretary, F. A. C. Starling, Carn Brea, R. S. O., Cornwall, England. J. Wickett, J. P., chairman; E. S. King, gen. mgr.; Nicholas Trestrail, engr. Organized May 24, 1900, under laws of Great Britain, capitalization £150,000, in 50,000 priority and 100,000 common shares, £1 par; issued, 38,607 priority shares and 96,953 common shares. Priority shares are entitled to all profits up to £1 per share, thereafter ranking as common shares. Paid dividends of 10% in 1907 and 5% in 1912.

Lands include the Carn Brea, Tincroft and Cook's Kitchen tin and copper mines, near Redruth and Illogan, production being mainly tin. Carn Brea was worked, 1832-1900, by cost-book companies, and paid a 10% dividend on preference shares, Sept., 1907. These mines, many years ago, made nearly 1,000 tons of copper yearly.

CARRENA COPPER MINES, LTD.

SPAIN

Office: 6 Broad Street Place, London, E. C., England. Mine office: Cabrales, Oviedo, Asturias, Spain. Organized Sept. 9, 1912; capitalization £20,000, shares 5s. par, for the purpose of securing control of the Compañia Minera Bilbaina. Owns 7 copper and 3 zinc mines, in an area of 284 acres, in Asturias, Spain.

CARRINGTON'S LION & 2 EAST GOLD & COPPER CO.

QUEENSLAND

Office: Charters Towers, Australia. Mine office: Liontown, Davenport Co., Queensland, Australia. Capitalization £25,000, shares 5s. par. Lands, 53 acres, near the Carrington United Mines Co., Ltd., developed by a 460' shaft, showing a 13" vein of ore carrying good average values in copper and gold, latter predominating. Stopes on the 4th level show 12 to 48" of heavy sulphide ore.

The smelter has 1 reverberatory furnace, for matting, and planned, 1907, sintering concentrates. In Nov., 1908, mine shipped 8 tons 13 cwts. of copper matte to the Port Kembla electrolytic works, assaying 57.8% copper, 10 oz. 15 dwts. silver and 9 dwts. 16 grains gold per long ton. Was a small producer at last accounts.

CARRINGTON UNITED MINES CO., LTD.

QUEENSLAND

Secretary, R. B. B. Clayton, 57 Bishopsgate, London, E. C., England. Mine office: Liontown, Davenport Co., Queensland, Australia. B. Thomas, mgr.; E. D. Miles, chairman; preceding officers, J. Marshland, W. F. Carrington, H. Pfeiffer and T. Webb, directors. Organized Oct. 18, 1906, as a merger of Carrington's Lion P. & C. Mining Co., Ltd., Carrington's Excess Ground Mining Co., Ltd., and various other companies, under laws of

Queensland, capitalization £60,000, shares 5s. par; issued 219,600 shares. Paid a 5% dividend Feb. 7, 1907, and a 10% dividend Feb. 3, 1910.

Lands, 125 acres, near Carrington's Lion & 2 East Gold & Copper Co., 30 miles south of Charters Towers. Mine has 4 shafts, deepest 630', showing strongly auriferous copper ore, with considerable bodies of copper sulphides in the bottom workings. Ore has been estimated to average about 10% copper, 1 oz. silver and 0.4 oz. gold per long ton, with an average value of £8 per ton.

The reduction works include a 20-ton concentrator having a Huntington mill and a smelter with 3 small reverberatory furnaces, producing blister copper when in blast, but now idle, smelting costs being very high. Employs about 100 men.

CARRIZAL SHARE TRUST, LTD.

CHILE

Secretary: H. J. Page, 21 Ironmonger Lane, London, E. C., England. T. P. P. Powell, chairman; G. R. H. Wilson and H. W. Kirby, directors. Organized Jan. 29, 1900, capitalization £110,000, shares of £1 par; issued 67,997 shares. Is a securities-holding corporation, holding 6,799 shares of the capital stock of the Soc. de Minas y Fundiciones de Carrizal out of a total of 21,000 shares issued. Paid total dividends of 7s. 4d. to end of 1907, and none since.

CARRIZAL; SOCIEDAD DE MINAS y FUNDICIÓN DE.

CHILE

Secretaries: H. J. Page, 21 Ironmonger Lane, London, E. C., England, and L. Tirapegui, Cathedral 2256, Santiago de Chile. Mine office: Chañaritos, Carrizo Bajo, Atacama, Chile. Works office: Canto de Agua, Freirina, Atacama, Chile. Samuel Gonzalez-Julio, chairman; C. Ferrara, vice-chairman; D. Gonzales-Julio, J. Izaga, M. Izaga, T. P. P. Powell, G. R. H. Wilson and H. W. Kirby, directors. Organized June 2, 1908, under laws of Chile, capitalization 2,100,000 pesos, shares 100 pesos par, fully paid and fully issued. Fiscal year ends Oct. 31. The Carrizal Share Trust owns about one-third of the stock. Dividends were 546,000 pesos in 1906; 210,000 pesos, in 1907 and none in 1908, with total dividends of 1,905,850 pesos to end of 1908.

Lands, 80 claims, area 555 acres, in 4 groups, and a 10-acre smelter site, with about 600 sq. miles of miscellaneous lands. Lands are in 4 groups, known as the Astillas, Carrizal Alto, Cerro Blanco and Jarillas, all in the Carrizal district, and include 14 different mines, many of which are idle. The Estancia de Jarillas is used for raising alfalfa, and the pasturage of animals. Ore of the different mines is mainly sulphide. Mines are heavily timbered, as a rule, at considerable expense. Ingersoll and Murphy rock drills are used, with dynamite and blasting gelatin for explosives.

The Amarilla or Agua Amarilla mine, at Cerro Blanco, opened 1867, has the Amarilla shaft of 1,617' depth, and La Estrella shaft of 1,765' depth, both vertical, and the mine is opened for a length of about 400 meters. Ores in upper workings carry considerable silver, decreasing with depth. Country rocks are porphyry and limestone. La Estrella shaft has its collar 90 meters from the outcrop, cutting the vein at 120 meters depth. The shaft is 2.7x4.2 meters in interior dimensions, framed with 12x12" timbers, and has a Tangye hoist. The Amarilla shaft has a hoist raising 1-meter cars with 1¼" cable, at hoisting speed of 150 meters per minute. About 300 men are employed in the Cerro Blanco mines.

The Astillas mine in the Frierina district, area 6 hectares, opened 1878, shows syenite, carrying a vein of about 10 meters average width of medium grade sulphide ore. Main shaft is 1,100' and mine is opened to length of 310 meters, with 15 levels. Equipment includes a 200-h. p. steam plant, and average force, 1909, was 45 men.

Los Bronces or Las Jarillas mine, opened 1881, has a 1,400' shaft and is practically a continuation of Las Astillas mine, with similar ore, but with vein somewhat broken at bottom. Recent explorations have shown strong indications of additional orebodies of promise.

The Coquimbana mine has an 820' shaft, with 9 levels opened, 1909, and is developed for length of 390 meters.

The famous Carrizal Alto group, now idle, includes the Armonia and Santa Margarita mines, the former, 1,200' deep, having been a notable producer for many years.

The Mina Socavón, at Carrizal Alto, has a vein with nearly N.-S. strike, and dip of 60 to 80°, in granite. Ores, to depth of 70 meters, are oxidized and associated with iron oxides, below which occurs chalcopryrite, disseminated in pyrite. Extreme depth is 281 meters, with horizontal workings of about 250 meters in length.

The Vizcachas mine, opened by a 103-meter shaft, has a vein of about 10" width, assaying 17.9% copper, and is somewhat wet.

The Larrahona mine has 3 levels opened with only a malacate for equipment. The Mina Mantos is an exploration only.

Equipment includes steam plant aggregating 144 h. p., with 5 hoists and an Ingersoll air compressor. A survey has been made for the Carrizal railway, planned to connect the mines and works.

The smelter, known as the Fundición de Chañarcitos, is an ancient establishment, on the Carrizal & Interior railway. There are six 13x20' reverberatory furnaces, idle since 1907, when a blast furnace was substituted, to great advantage. The cupola is a 42x84' Allis-Chalmers water-jacket blast furnace of 50 tons daily capacity, with rectangular forehearth and a 10-h. p. Connorsville blower. The dust chamber is of insufficient size, causing considerable loss of copper through volatilization. Formerly about two-thirds of ore treated was calcined, but semi-pyritic smelting was begun, 1908, reducing coke charges to 6.5%, with great reduction of cost, fuel being costly imported coke. Flux is cupriferous calcite carrying about 2.6% copper in the proportion of 18% to ore charges. Slags, hauled by mules, assayed 0.869% copper, 1907. The converter department has 5 shells. Matte is sent to the Guayacán smelter. Smelting costs were 20.64 pesos per metric ton in 1903, reduced, 1909, to about 16 pesos per ton.

CARRIZALILLO; MINAS DE COBRES DE.

CHILE

Mine office: Chañaral, Atacama, Chile. Property includes several old and deep mines, with one shaft of 2,122' depth. Idle some years, because of heavy inflow of water, the mine lacking adequate pumping equipment.

CARTER'S CONSOLIDATED, LTD.

NORTHERN TERRITORY

Mine near Mt. Diamond, Northern Territory, Aus. Idle. See Vol. X.

CARVALLO; GUILLERMO.

CHILE

Office, mine and works: Llaillai, Quillota, Valparaíso, Chile. Property includes the Santa Maria and Santa Elena mines, carrying a vein up to 2 meters in width, with approximately N.-S. strike and dip of about 45°, opened to 120 meters by a 600-meter tunnel. Mine shows oxidized ores and bornite, but has not reached the zone of primary sulphides. Ore as mined averages about 7% copper, with calcite gangue.

The smelter, 3 miles from the mine, known as the Fundición de Llaillai, has a 14x26' reverberatory furnace, burning Australian and English coke, costing 21 pesos per ton, 1 ton of coke being required to smelt 3 tons of ore. Matte is 50% or better in tenor and slags average about 0.5%. Production, 1903, was 3,000 metric tons of ore, of about 8% copper tenor, yielding 496,035 lbs. fine copper. Production 1910 was 100 to 150 metric tons monthly of 12% selected ore, sent to other smelters for re-

duction, yielding 400,000 lbs. fine copper, the smelter being idle, 1912, on account of the high price of fuel.

CASAPALCA SMELTER.

Owned by Backus & Johnston Co., at Casapalca, Peru.

PERU

CASTELLANOS y CA.

CHILE

Mine office: Combarbalá, Coquimbo, Chile. Production, when working, was about 75 tons fine copper yearly, shipped as matte. Idle.

CASTILLO DEL BUITRON; MINA.

SPAIN

Owned by Compañía del Ferrocarril y Minas del Buitron, and operated under lease, by United Alkali Co., Ltd., at Valverde del Camino, Huelva, Spain.

CASTILLO DE LAS GUARDAS; SOCIEDAD

ESPAÑOLA MINAS DEL.

SPAIN

Office: Apartado 162, Bilbao, Spain. Mine office: Castillo de las Guardas, Sevilla, Spain. José A. Jáuregui, chairman; Victoriano Galdiz, vice-chairman; Julio Astoreca, sec.; Cipriano R. Careaga, managing director; preceding officers, Anselmo R. de Rivas, Martín Aldama, Juan de Arteché, Alejandro Gandarias, Luis Nuñez, Agustín Iza, Enrique Díaz Rubín, Juan de Santisteban and Fernando Merino, directors; Francisco de Zarraga, supt.; Constancio Fernán, cons. engr.; Ceferino López Sánchez AVECILLA, engr. Organized July 12, 1901, under laws of Spain, capitalization 7,500,000 pesetas, increased later to 10,000,000 pesetas, shares 500 pesetas par; issued, 9,000,000 pesetas. Debentures, 1,500,000 pesetas authorized, at 5%; issued, 1,250,000 pesetas. Annual meeting in March.

Lands, 153 hectares, 23 kilometers from Zalamea La Real, having a 15½-kilometer private railway, known as the Ferrocarril de Minas Castillo y Empalme Ronquillo, connecting, at Estación Ronquillo, with the Ferrocarril Sevilla y Cala. Property shows granite-porphry and diabase, carrying 5 orebodies, 1 of which, under development, has a lens of 40 meters width and 220 meters length, proven for depth of 165 meters, carrying cupriferous pyrite averaging about 1.5% copper, 0.5% lead, 0.13% zinc and occasionally up to 2 oz. silver and 4 grams gold per metric ton. Mine was discovered 1843, and worked in a small way, until taken over by the present company, 1901. Development is by the following shafts. Meneses, 142 meters; Don Pablo, 142 m.; Todos Santos, 41 m.; Nueva Corta, 50 m.; Malacate, 46 m.; Colorado, 110 m.; Dos de Mayo, 40 m.; Remedios, 42 m.; San Felipe, 102 m.

Equipment includes a 683-h. p. steam and electric plant, with two 200-h. p. hoists, good for 140 meters each, a Duisburger 4-drill air compressor and Becker and Siemens & Schuckert electric drills.

The company owns 153 buildings, with stone shops, including an 8x10 meter machine shop; 8x20 m. smithy; 8x10 m. carpenter shop, engine houses, boiler houses, offices, and a large number of dwellings. The company maintains separate schools for boys and girls, a hospital for workmen and their families, and a town hall.

CATALANA-VALENCIANA; SOCIEDAD MINERA.

SPAIN

Office: 4 Calle de Gerona, Barcelona, Spain. Mine office: Azuebar, Castellón de la Plana, Spain. Domingo H. Santías, gen. mgr., at last accounts. Organized July, 1909, under laws of Spain, capitalization 250,000 pesetas, shares 500 pesetas par. Property, the Maria and Virginia mines, carry cinnabar and copper ores. Idle.

CATÉMOU; SOCIÉTÉ DES MINES DE CUIVRE DE.

CHILE

Office: 5 Rue du Helder, Paris, France. Operating and works office: Nilgue, Estación Chagres, Putaendo, Aconcagua, Chile. A. W. Lehmann, gen. mgr.; Achille Adam, chairman; Max Lyon, managing director; Eugene

Renevey, Georges Renevey and R. Franklin, directors; Guillaume Wouters, sec. Organized June 2, 1899, under laws of Belgium, capitalization f5,000,000, shares f500 par, divided into 10,000 preference shares at 8%, and 35,000 ordinary shares, nonassessable. Debentures, f2,500,000 5% bonds. Annual meeting, last Friday in June.

Dividends have been paid as follows: 4% in 1910, 5% in 1911, and 6% in 1912.

Lands, 155 claims, with sundry miscellaneous tracts held in fee and under government concessions, including the Finca de Ñilhue, of 7,500 hectares, giving total holdings of 30,000 acres, in the districts of Putaendo, Los Andes, Melipilla, La Ligua, Quillota and El Ñilhue. Property includes numerous mines in Catému, Melon and elsewhere, with quarries of fluxing material, and the Finca de Ñilhue carries a stock of 1,200 cattle, for transport and food, and is a valuable factor in reducing costs.

The local management reports that ores carry an average of 4% copper, and 2 oz. silver per ton. Veins carry the usual oxidized ores in a comparatively shallow surface zone, succeeded by chalcocite, bornite and chalcopyrite.

Los Mantos, or Mantos Rojos, mine, opened 1820, has country rocks of sandstone and limestone, with eruptive dikes traversing the sedimentaries, there being 2 blanket veins, of 5 to 7' thickness, composed of calcareous matter impregnated mainly with bornite, but having a little chalcopyrite and occasional gray copper, ore ranging 3 to 4.5% copper, 1% lead, 2% zinc and 30 grams silver per metric ton. The oxidation zone has been eroded, leaving only sulphide ores. These blanket veins have been worked on a considerable scale since 1835, and the ore, while low in grade, is especially suitable for fluxing purposes.

Mine is developed exclusively by tunnels, having a vertical depth of about 50 meters and length of about 1,200 meters, with ore reserves developed for 3 to 4 years extraction. The mine produces no water, and walls stand excellently without timbering. Owing to development by tunnel and lack of water, Los Mantos has no machinery plant. Work is exclusively by contract, according to tonnage produced, miners being paid 5 to 7 pesos per metric ton for ore won. Only about 8% of the ore broken is discarded as waste, and ore is concentrated or smelted direct. Ore is taken to the smelter by an 1,580-meter Bleichert aerial tram, with drop of 750 meters, having 500-kg. buckets. Cables last 2 years and guide cables last 5 years. In 1912 Los Mantos mine employed 350 men, producing monthly 2,000 to 2,500 tons of ore of 3% copper tenor.

El Soldado mine, one of the Nogales group, and the greatest distance from the smelter, being in the Commune of Melon, on the Calera é Cabildo railway, was opened 1841. This property has 15 known veins, of 5 to 7' average width, carrying mainly copper sulphides, with quartz gangue. Several veins carrying oxidized copper ores, with gangue of aluminous silicates, the series of veins having an approximately N. S. strike, with dip of 45° east, between trachyte and feldspar-porphry. The series of veins is faulted, frequently with throws of 1 to 2 meters, and there is another series of dikes and veins crossing at approximately right angles to the dip, but with parallel strike, the dikes being partly decomposed porphyry, carrying occasional oxidized ores and aluminous silicates. These veins have been worked extensively in the past, showing many antigua openings and ore averages 5 to 6% in copper tenor. Development is mainly by tunnels, greatest vertical depth obtained being 80 meters and old workings are about 150 meters in length. This mine shows some immense chambers, 1 being called the Cathedral, in recognition of its vast size. In 1912 production was about 600

metric tons of high-grade ore monthly, secured with an average force of 150 men. Transportation is by wagon at a cost of 3 to 4 pesos per ton. An aerial tram is planned.

La Unión group includes the Restauradora, San José and Vieja mines, producing about 40 metric tons daily of 3 to 4% copper ore, mainly used for fluxing, secured with an average force of 150 men.

Miscellaneous mines include El Ñilhue mine, in the department of Putaendo, opened 1886; Las Máquinas de Catemu mine, in the department of Putaendo, opened 1870; La Esmeralda mine, opened 1860; La Constancia and La Democracia mines, 10 kilometers from the smelter, carrying blanket veins, and La Marquesa, Malva, Tabourina, Caracoles, Almendro y Pleito and other properties, in various stages of development, some of considerable promise.

The mines and works have telegraph and telephone communication. Forces, 1912, averaged 800 men, with the high average wages of 5 pesos for underground workmen; and 4 pesos for surface labor.

Reduction works include 2 smelters, each with converter plants, with aggregate capacity of 400 to 500 metric tons of ore daily.

La Poza plant is at Chagres, 12 kilometers from Chagres station, on the Andes R. R. These works are equipped mainly with American machinery.

La Poza smelter, of 300 tons daily capacity, has 2 old 75-ton rectangular water-jacket blast furnaces, and new blast furnaces of 36x96" and 35x84" dimensions at the tuyeres, turning out 50% matte. The converter department has five 57x77" shells, with 12 tuyeres each, of the Copper Queen type, turning out cakes carrying 99.7% copper and 40 oz. silver per ton. There is a 40-ton briquetting plant and the converter department has a quartz mill. Power is furnished by a 165-h. p. Pelton water wheel and a 175-h. p. engine. Furnace blast is supplied by No. 6 Connorsville blowers and converter blast is furnished by a Riedler air compressor, with capacity to reduce 20,000 cu. ft. of free air per minute to 15 lbs. pressure. Fuel is coke, 1 ton of coke smelting 6 tons of ore, ores treated being highly silicious, with slags averaging 0.4 to 0.5% copper. In 1912 La Poza smelter treated 51,000 metric tons of ore, of 6% average tenor, obtaining therefrom 3,000 metric tons fine copper, employing 90 men at average wages of 3.5 pesos daily.

El Cobre del Melón smelter, 16 kilometers from Estación del Melon, on the Calera & Cabildo railway has a 36x84" and 36x120" Allis Chalmers cylindrical water-jacket blast furnace and converters. Ores smelted at this plant carry excess of silica and alumina and are deficient in sulphur, necessitating the free use of low-grade cupriferous pyrite and limestone, for fluxing. Fuel is very expensive, coke costing 70 pesos per metric ton, and English coal 60 pesos per ton, 1 ton of fuel smelting about 3.5 tons of ore. Equipment includes a Pelton water wheel, 60-h. p. locomotive and No. 6 Green blower. A 4-kilometer aerial tram is proposed to the Nogale group.

Production was 3,379,947 lbs. fine copper in 1907; 4,060,873 lbs. in 1908; 4,073,761 lbs. in 1909; 4,920,500 lbs. in 1910; 4,660,000 lbs. in 1911, and 6,960,000 lbs. in 1912. Property is estimated to have, with further improvements, a productive capacity of 10,000,000 lbs. fine copper yearly. Management is good.

CAUCASE; SOCIÉTÉ INDUSTRIELLE ET METALLURGIQUE DU.

RUSSIA

Office: 11 Rue Saint-Florentin, Paris, France. Mine office: Alverdschi, Bortschalo, Tiflis, Russia. Lands, about 5 miles south of Tiflis, include ancient mines of auriferous and argentiferous copper and lead ores. Production was approximately 5,000,000 lbs. fine copper in 1911 and 6,900,000 lbs. in 1912.

CAUCASUS COPPER CO., LTD.**RUSSIA**

Secretary, F. E. Palmer, 82 Palmerston House, London, E. C., England. Mine office: Dzansul, Kutais, Russia. W. R. Van Liew, gen. mgr.; J. Colquhoun, chairman; M. Grancini, E. B. Lockhart and J. N. Sparks, directors; E. Kneeland, supt. Organized Oct. 4, 1900, under laws of Great Britain, capitalization £500,000, increased June, 1912, to £1,000,000, shares £1 par; 507,700 shares issued and fully paid; £500,000 profit-sharing certificates of no nominal value, granted to bondholders, entitling them to one-half of profits, after meeting charges of bond debt together with £299,900 in options have been called in for conversion. Debentures, £45,280, 5% bonds redeemable by annual installments of not less than 10%, also £1,245,900, 5% second debentures redeemable at not less than 5% per annum after Sept. 30, 1913, series B, £500,000, being convertible into full paid shares at par. The value of the ordinary share has been much increased by the rearrangement of the finances in 1912. The issued capital of the company now consists of £500,000 ordinary shares and there are £45,280 of 5% first debentures, £500,000 convertible 5% second debentures and £745,000 non-convertible 5% second debentures. Statement for year ended June 13, 1912, showed net profit of £1,763. Shares are listed on the London Stock Exchange.

Lands are 6 groups, including the Dzansulske copper mines, in the Murgul valley, in the Artvin district of Kutais, in the Russian Caucasus, about 50 miles from Batum. Mine is developed extensively, management estimating 3,600,000 long tons of 3.1% copper ore practically in sight. Ore has chalcopyrite, minutely subdivided, in connection with pyrite, and is friable and slimes very easily, causing low recovery. Principal orebody is a mammoth lens of 164 to 328' width by 1,000' length. Other orebodies are believed to exist on the company's lands.

Mining methods were changed in 1912 and the loose surface soil, from 10 to 100' thick, is now removed by hydraulicking. The ore is now shot down into the great opencut and handled by the funnel, or milling system, doing away with shoveling.

A new aerial wire rope tramway, built in 1912, has a capacity of 2,000 tons per day.

The 1,000-ton mill has electric power, with automatic operation throughout. The ore slimes in concentration, is high in silica and fluxing ores are secured with difficulty. Magnetic separation plant, was abandoned, 1909, and wet concentration is now used. Ores are crushed to 4-mm. size by Blake crushers and Hadfield high-speed rolls, then sent by aerial tram to the concentrator, where ground by Chilean mills and jigged, coarse tailings then being ground to 1-mm. size in Chilean mills, and all tailings treated on Frue vanners.

The old smelter, taken over with the property, was first increased to 300 tons capacity, then rebuilt, 1907-08, to 500 tons daily capacity. Concentrates are dried, calcined and smelted in reverberatory furnaces fired with petroleum and matte is converted and copper refined.

A new 19x89' reverberatory furnace, built 1912, utilizes the waste gases for steam production.

Production, 1911-12, was 6,060,000 lbs. fine copper. After years of difficulty the company now appears to be emerging into a period of prosperity. It must be remembered that it has the advantage of the higher price of copper ruling in Russia, due to the heavy import duty.

CAUCASUS COPPER INDUSTRY CO.**RUSSIA**

Mine office: Armavir, Kutais, Russia. Production was 3,257,465 lbs.

fine copper in 1907; 4,195,825 lbs. in 1908; 6,608,426 lbs. in 1909, and 3,700,000 lbs. in 1910. No recent returns secured.

CAYLLOMA; SOCIEDAD ESPLOTADORA DE.

PERU

Office: Valparaíso, Chile. Mine office: Caylloma, Arequipa, Peru. Alfred Fox, supt. Organized May 23, 1906, under laws of Chile, capitalization £32,000, shares £1 par. The mines are 17,000' above sea level and the climate is very frigid. Company employs about 200 men and furnishes good dwellings for employees. Ore values are mainly in silver averaging 600 grams, about \$15 per ton. A steam tramline connects the mines and mill and at last accounts management planned replacing the old installation with a modern cyanide plant. Concentrate is packed on llamas to the railway.

CENTRAL CHILI COPPER CO., LTD.

CHILE

Secretary: H. L. Bromhead, 15 Angel Court, London, E. C., England. Mine and works office: Panulcillo, Ovalle, Coquimbo, Chile, B. Schiff, gen. mgr. Eugene A. J. Goldschmid, chairman; Bertrand C. Hinman, managing director; Thos. Higgins, smelter supt.; R. L. Lee, asst. smelter supt.; J. W. Maxwell, mine supt.; C. A. Gibbons, Jr., engr. Organized June, 1894, as a reconstruction of the Panulcillo Copper Co., Ltd., and reorganized, Jan., 1898, capitalization increased Nov., 1905, to £400,000, shares £1 par; issued, £312,468. Dividends were 6d. April 10, 1900; 6d. Jan. 22, 1901; 1s. May 31, 1907. Net earnings were £10,932 in 1905; £24,913 in 1906; £12,684 in 1907; 1908 gave a net loss of £12,616; 1909 a net profit of £6,712; 1910 a profit of £7,954, and 1911 a profit of £2,191.

Lands include mines at Panulcillo, 25 kilometers northeast of Ovalle, and mines in the vicinity of Nisñile. The Panulcillo group, area 56 hectares, 2 kilometers from the smelter, includes the Panulcillo Alto and San Gregorio mines, showing strong lenses of ore up to 150' in width, with generally N.-S. strike, and dip of about 45°, worked to depth of 200 meters and for length of 1,500 meters, principal development being by the 1,000-meter San Gregorio tunnel. Ore is mainly chalcopyrite, associated with pyrite, in limestone gangue, with some commercial production of malachite, azurite and chalcocite. Average assay of ore is 3.93% copper, with about 12 grams silver per metric ton, and ore is strongly aluminous. Production is about 100 metric tons daily. Power drills are used. Ore reserves were estimated, 1911, at 10,000 tons, with probable ore at about 14,000 tons.

La Condesa mine, 3 kilometers from Panulcillo, has a 5' vein, with nearly N.-S. strike, and is opened to depth of about 100'. This mine is in the hands of tributors.

The Cocina and Inagotable mines, at Ferro Negro, show lenses up to 70' in width, with dip of about 45°. Production, 1911, was only 600 metric tons of 5.3% ore, secured on tribute.

The Nisñile mine has a stockwerk, opened by 3 tunnels to depth of about 300 meters, carrying ore averaging 6.11% copper, 20 grams silver and 3 grams gold per metric ton.

Holdings were increased, 1911, by purchase of one-half interest in 2 claims, 10.48 acres, and by denouncement of 6 claims, total 49.42 acres.

The 400-ton smelter, connected with the Panulcillo Alto mine by tram, is 76 kilometers from Coquimbo, with freight rates of 3.1 pesos per metric ton on fuel, and 6.7 pesos on matte and copper exported. This plant does a considerable custom business, employing 175 to 250 men, at average wages of 2.8 pesos daily. Equipment includes 3 calciners, 2 reverberatory furnaces, and one 46x180" and three 42x84" blast furnaces. The plant lacks a converter. Slags are hauled in cars to the dump. The smelter has 2 Cornish and 2 Lancashire boilers, of 160-h. p. each, one 100-h. p. and three

60-h. p. engines, and 2 Connorsville blowers. There is also a crusher, and in connection are a machine shop and a good laboratory. The smelter treats silicate custom ores, company's sulphides furnishing flux. Matte is crushed and exported to New York for smelting. In 1911, company smelted 19,253 tons of its own ore, averaging 3½% copper and 16,664 tons of purchased ore, averaging 7.75% copper.

Production, 1911, was 2,265,440 lbs. fine copper.

CENTRAL DE COLLAHUASI; SOCIEDAD MINERA. CHILE

Office: Santiago de Chile. Mine office: Collahuasi, Tarapacá, Chile. Organized Feb. 14, 1906, under laws of Chile, capitalization 90,000 pesos, shares 15 pesos par. No trace of operations secured and presumably moribund.

CERRO BLANCO; COMPAÑÍA ESPLOTADORA DE MINAS DE. CHILE

Office: Valparaíso, Chile. Mine office: Copiapó, Atacama, Chile. Organized July 22, 1901, under laws of Chile, capitalization 195,000 pesos, shares 130 pesos par. No trace of operations secured and presumably idle.

CERRO DO GARALDO; MINA. BRAZIL

Mine office: Cacapava, Rio Grande do Sul, Brazil. Lands, 4 kilometers northeast of Cacapava, show ore outcropping at the summit of a steep hill, slightly developed by 6 very shallow shafts, bottomed in mica-schist impregnated with chalcocite. Idle.

CERRO DE LA GLORIA; COMPAÑÍA MINERA. CHILE

Office: Santiago de Chile. Mine office: Cachapoal, O'Higgins, Chile. Organized Nov. 28, 1906, under laws of Chile, capitalization 2,160,000 pesos, shares 25,000 pesos par. No trace of operations secured.

CERRO MARTINO; MINA. BRAZIL

Idle. Property in Rio Grande do Sul, is 130 kilometers from Cachoeira. Described Vol. X.

CERRO DE PASCO COPPER CO. PERU

Office: 15 Broad St., New York. Mine office: Cerro de Pasco, Junín, Peru. Organized 1908, under laws of New Jersey, capitalization \$60,000,000, shares \$1 par. Controls the Cerro de Pasco Mining Co., through ownership of entire stock issue, and is controlled, through stock ownership, by Cerro de Pasco Investment Co. A 5% stock interest in this company was given the Compañía Empresa Socavonera del Cerro de Pasco in exchange for rights acquired through the completion of the Rumiallana drainage tunnel, 1907.

CERRO DE PASCO; COMPAÑÍA EMPRESA SOCAVONERA DEL. PERU

Office: Calle San José No. 135, Lima, Peru. Mine office: Calle Bolognesi No. 40, Cerro de Pasco, Junín, Peru. José Payán, chairman; preceding officer, Baldomero Aspillaga, Américo Denegri, Octavio Besancon, Joaquin Godoy, J. A. Barrios and Ernesto Odriozola, directors; Pedro Larrañaga, sec.-treas.; Wm. C. Dawson, agt.; John B. Wilson, engr. Organized Nov., 1900, under laws of Peru, capitalization £750,000, shares £1 par, nonassessable; issued, £720,000. Debentures, £60,000, at 8%.

Company holds a concession from the Peruvian government to drain the Cerro de Pasco mines by means of tunnels and collect a royalty of 20% on ore extracted from mines so drained. Property is the 10,551' Rumiallana tunnel, completed 1907, and the Quinlacoche tunnel of about 6,000' length. Mine also has the 430' Mesapata shaft and the 432' Yauricocha shaft, both equipped with hoists. Machinery includes a 10-drill Rand air compressor and there are several stone buildings. This company can collect royalties from other operators, in the district drained, but has taken a 5% interest

in the shares of the Cerro de Pasco Mining Co. in exchange for its drainage rights against the Cerro de Pasco Mining Co. It is proposed driving laterals to the east and west and extracting ore from this company's property.

CERRO DE PASCO INVESTMENT CO.

PERU

Is a holding company, controlling the Cerro de Pasco Copper Co., through ownership of large share interest and through this company it controls the Cerro de Pasco Mining Co. and its Peruvian mines and holdings.

CERRO DE PASCO MINING CO.

PERU

Office: No. 15 Broad St., New York, H. Esk Maller, treas. Peruvian general office: Lima, Peru. Mine office: Cerro de Pasco, Junín, Peru. Works office: La Fundición, Tiñahuarca, Junín, Peru. W. J. Hamilton, gen. mgr.; F. W. MacLennan, mine supt. Organized June 6, 1902, under laws of New Jersey, capitalization \$10,000,000. Owns the entire stock issue of the Cerro de Pasco Railway Co., and entire stock issue of Sociedad Minera Copayacocha, and entire stock issue, excepting founders' shares, is owned by Cerro de Pasco Copper Co., which in turn is controlled, through stock ownership, by Cerro de Pasco Investment Co. Mr. J. B. Haggin is said to hold about 40% of the total investment.

Lands, 941 claims, and 70,000 acres miscellaneous lands, including copper claims in the Morococha and Yauli districts and about 400 acres of land that includes three-fourths of the rich Cerro de Pasco district, with a smelter site and extensive coal tracts north of Cerro de Pasco.

Cerro de Pasco lies 14,300' above sea level, rendering physical labor very fatiguing. The population of the town is about 6,000, of whom but 60 are white and only 10 of these are women. The region is bleak and all food and supplies must be brought in from considerable distances. The year has but 2 periods, the wet and dry, the former from November to April. Both are said to be bleak and exceedingly disagreeable. Snow and hail fall at any time, summer or winter, but rarely remain on the ground as long as 48 hours, even in winter. The fluctuation between mean summer and winter temperature is about 20° F. only, less than the daily variation.

Silver was discovered at Cerro de Pasco, A. D. 1630, and the mines produced, to the close of the nineteenth century, about 450,000,000 oz., from 40,000,000 tons of silver and copper ore, nearly all extracted by hand work and carried 3 to 6 miles on the backs of llamas, to primitive smelters, whence the silver bullion was transported by llamas 200 miles to Lima, until 1870, when a railroad was completed to Oroya. Formerly only the copper ores of 25 to 40% copper were shipped.

Authorities disagree as to the geology of the district, but over an area a mile wide and nearly 2 miles long, nearly every claim carries ore, proving Cerro de Pasco one of the richest mineral fields of the globe. The ore-bodies outcrop prominently, as crestones, or ridges, and carry gold, silver, copper, lead, zinc and cobalt. The oxidized zone carries considerable gold, running as high as 1 to 2 oz. per ton, occurring in rich but erratic shoots. The high silver values usually extend to about 100' depth only, occasionally running up to thousands of ounces per ton, followed by rich silver-copper ores, which in turn, at a little greater depth, are succeeded by ore low in silver but richer in copper, the copper ores being estimated to have averaged 15 to 35 oz. per ton in the old workings. Primary ores below the water level contain bornite and chalcopyrite, associated with pyrite, tetrahedrite, arsenopyrite and sphalerite, containing little silver and only traces of gold. There are occasional veins of high-grade silver-lead ores, with others carrying up to 8% zinc; practically all the copper ores are bismuthiferous, hence refractory in reduction. The ores carry about 35% silica and

14 to 30% iron, the excess of silica requiring considerable limestone for fluxing.

The property of the Cerro de Pasco Co. includes hundreds of old mine workings, some opened to 300' depth, though the majority are not over 100' deep. The surface of the property shows scores of tajos, big pits resulting from the caving in of old open cast workings, some of these being 300' deep. The property lies in a basin, and the mines are very wet, especially below a depth of 400'. The Rumiallana drainage tunnel, begun April, 1877, by Henry Meiggs, was completed 1907, by the Compañía Empresa Socavonera del Cerro de Pasco, with which a financial arrangement was made, through a 5% stock interest given in the Cerro de Pasco Copper Co., obviating the payment of the 20% royalty to which the former company was legally entitled.

The present company has disregarded old workings and opened a new mine, by 2 tunnels, of about 2 miles length each, and 5 new shafts. The Diamante, Peña Blanca, Carmen and Noruega 2-compartment shafts have 4 levels opened, and are bottomed at 410'. The new 4-compartment Esperanza shaft is planned to do the hoisting for the entire mine and the shops and power plant are near this shaft. Waste is used for filling, timber being very expensive, and used only for lining shafts and timbering important tunnels. The mines are equipped with powerful pumps. Estimates of ore in sight vary from 2,000,000 to 75,000,000 tons, the latter figure being excessive, and not countenanced by the management, but there unquestionably are large reserves of ore blocked out, these including first-grade ore of 8 to 10% copper tenor, with good silver values, and second grade ore, of uncertain copper tenor, though probably workable in the main.

The reduction works, at La Fundición, near Tiñahuarea, 9 miles from the mines, are connected therewith by rail. All buildings are of steel frames, covered with corrugated iron. The plant treats a small quantity of custom ores and has a sampling mill with crushers, rolls and chain-bucket elevators. The works are terraced throughout, permitting the handling of material by gravity, and are built on the unit plan, so that their capacity may be doubled or, if desired, quadrupled at later date.

The furnace building has twelve 2,000-ton flat-bottomed steel ore bins, with lining of double thickness of 2" plank, filled from railroad tracks above, and loading into charging cars run alongside, that are drawn by small locomotives on a narrow-gauge track running on either side of each furnace, 2 cars constituting a charge. There are four 56x180" water-jacket blast furnaces with brick-lined hearths and crucibles, discharging into five 16' settlers. The furnaces are of about 300 tons actual daily capacity each. Slag is granulated by running water. The smelter building has a steel stack, 220' high and 20' in diameter. There are 6 reverberatory furnaces, and ten 18' six-hearth McDougal calcining furnaces. A Dwight-Lloyd sintering plant was erected 1912.

The converter department, in a separate building, has 7 stands, with 84x180" shells. The converters, of the upright pattern, are tilted hydraulically and blister copper is poured into moulds on a low car under the stand, cars being shifted hydraulically. The converter slags pour into ladles and thence into iron moulds, slags being crushed in 2 slag mills and discharged into bucket elevators, going to a storage bin on the feed floor, for resmelting. The converter department has quartz mills for linings and 2 large storage bins for material. Product of the converter is 99% blister copper, in cakes, shipped to Baltimore for refining.

The power plant includes a boiler house with sixteen 250-h. p. Babcock & Wilcox boilers, and an engine house, latter having a 600-h. p. Nordberg

cross-compound engine, direct-connected to a 440-kw. Westinghouse generator; two 475-h. p. Nordberg engines, direct-connected to two 250-kw. generators; a 750-kw. Westinghouse alternator and dynamo and 2 smaller dynamos furnishing electric power and light. There are 3 No. 11 Connorsville blowers, driven by a Nordberg cross-compound engine, a large Nordberg air compressor for converter blast, and an air compressor for the pneumatic operation of furnace doors, etc. The power plant is practically duplicated, as a precaution against accidents.

A new 12,000-h. p. hydro-electric plant will be completed in 1913 and will greatly help the company's operations. The plant has a 10½-mile ditch and pipe line with a fall of 750' delivering 200 second-feet of water to 6 Pelton wheels connected in sets of 2 with three 3,000-kw. dynamos. The transmission line is 70 miles long and will serve both Cerro de Pasco and Morococha. The entire plant will cost \$1,000,000.

The adoption of electric power will greatly relieve the fuel situation and make the company practically independent of foreign coke.

The company furnishes its own fuel, owning extensive beds of bituminous coal, of rather indifferent average quality, though with some coal of coking grade. The principal coal mines are at Goyllarisquisca, Quishuarcancha and Vincuscancha. A 21-mile branch line of the railway terminates at Goyllarisquisca, the Vincuscancha coal mine being about midway and it has been proposed to install an aerial tram to connect with the Quishuarcancha, at present accessible only by wagons and pack animals. There are large reserves of coal of fair quality at Goyllarisquisca and Quishuarcancha. The coke plant, near the smelter, has seventy 75-ton beehive ovens, making a satisfactory coke for blast furnace use, no coke being imported. The coal contains 50 to 60% fixed carbon, 20% volatile matter and about 13% ash, with considerable sulphur.

The company's brick plant has proven an important success, as imported brick of all kinds are very costly, and the local plant turns out fire and silica brick of very fine quality, from clays found in the mines, and common building brick are made from a clay pit near the Vincuscancha mine. This plant also makes tile and tile pipe.

A limestone quarry, 12 miles from the works, furnishes flux, and the company has a silica quarry furnishing material for lining converter shells.

The Cerro de Pasco railway, owned by the company and operated under a government concession, has a main line of 83 miles, running from Cerro de Pasco to Oroya, where connection is made with the Central Railway of Perú, which runs thence 130 miles to Callao, the latter line being one of the most notable in the world, having cost \$43,000,000, and gaining nearly 3 miles vertical elevation, reaching the highest altitude of any railroad on the globe, after surmounting almost incredible obstacles, having an average grade of 2.5%, with no less than 57 tunnels, including the Galera tunnel of 1 kilometer length which cuts through a ridge of the Andes. The Cerro de Pasco railway has a 21-mile branch to the coal fields, and, with all spurs, sidings and yards, has about 125 miles of standard-gauge track. The main line has an average grade of 1.5%, with a maximum grade of 3%, and cost upward of \$2,000,000. Equipment includes 13 locomotives, in addition to 6 light switching engines at the smelter, and 59 steel ore and coal gondolas, with a total of 247 forty-ton cars, rolling stock being of the best American manufacture. The railroad is on a paying basis.

The company has 2 hotels, one for native and one for American labor, and maintains a clubhouse with bowling alley, swimming pool, gymnasium, etc., which is a social center and aids greatly in keeping the American workmen and their families contented. The company also furnishes facili-

ties for riding and hunting. Although the altitude is very high, people of normal good health find no difficulty in living comfortably in the rarified air of Cerro de Pasco. Wages range from \$2.50 to \$4 per day for white labor, and 60 to 75 cts. per day for native common labor, the latter being tractable, and, for some purposes, fairly efficient. Up to \$2, and even \$2.50 per day, is paid the native timbermen. In 1912 the company employed about 2,200 men at the copper mines, 1,500 men at the smelter, 1,000 at the Goyllarisquisca coal mine, 400 at the Vincuscancha coal mine, and 200 at the Quishuarcancha coal mine.

Recent production has been as follows: 3,389,787 lbs. fine copper in 1906; 20,258,689 lbs. in 1907; 23,646,921 lbs. in 1908; 30,327,423 lbs. in 1909; 34,713,012 lbs. in 1910; 48,600,926 lbs. in 1911, and about 4,000,000 lbs. monthly in 1912 and 1913.

The Cerro de Pasco is undoubtedly the most expensive copper proposition ever developed, the total investment to date being nearly \$25,000,000. Many serious discouragements were met in the earlier days, but overcome, and sufficient progress has been made to justify terming the property a success. The ores are refractory and the great altitude of the smelter, which is 14,300' above sea-level, coupled with inefficient native labor, have given rise to an exceedingly complex and tiresome problem in ore reduction. Statements in the press that the cost of copper is only 4 cts. per pound are not reflected by dividends, and other press reports giving a cost of 7 cts. per pound, laid down in New York, are considered a serious overestimate, though, in all likelihood, the production is now yielding the company a profit, with prospects of increased production and much lower costs ultimately. The property is considered to have a probable productive capacity of 50,000,000 lbs. yearly.

CERVERO SUCESIÓN.

CHILE

Mine offices: Los Marquis, La Ligua, Aconcagua, Chile, and Ñipa, La Ligua, Aconcagua, Chile. Works office: Cabildo, La Ligua, Aconcagua, Chile. The Padres and Fraguas mines adjoin the Maquis mine of Otto Harnecker, and the ores are similar in character. The greatest vertical depth is 130 meters, with extreme horizontal length of about 200 meters.

The Mina Maria, at Los Mercedes, 16 kilometers from Cabildo, has a vein in granite, ranging up to 15' in width, with strike of 50° W., and dip of 68°, carrying auriferous and cupriferous pyrite, with quartz gangue, ore averaging about 4% copper and 40 grams gold per ton.

The Mina Montoya, opened 1855, has a 900' tunnel opening a 15' vein in porphyry, carrying argentiferous sulphides with calcite gangue.

The Ñipa properties, 16 kilometers from Cabildo, include the Castillo, Quisco and Cuevas mines, having an extreme depth of 350 meters, with 800 meters extreme length of workings.

The mines at Los Marquis produce 6% ore and the Ñipa mines make a small production of selected ore averaging 25% copper, after discarding large quantities of ore of about 4% tenor, suitable for concentration later. Average of all ores treated is about 5% copper.

The Fundición de Cabildo, at the terminal of the Calera & La Ligua railway, formerly did a general custom business, but has been idle since 1907 and apparently is permanently out of blast. This was described Vol. VIII.

CHAGALI-HÉLIAR; SOCIÉTÉ D'INDUSTRIE MINIÈRE DE.

RUSSIA

Office: 19 Rue Godot-de-Mauroi, Paris, France. Mine office: Borchalinsk, Tiflis, Russia. Alfred Massenet, pres. Organized July 12, 1900, under laws of France, capitalization fl,600,000, shares fl00 par, increased, Oct. 19,

1909, to \$2,600,000, shares \$100 par. Mine has 2 shafts, and employed, 1909, an average of 133 men, of whom 72 were underground. Equipment includes a hydraulic power plant and a small smelter. Presumably idle.

CHAÑARAL; COMPAÑÍA ESPLORADORA DE.

CHILE

Mine office: Tres Puntas, Chañaral, Atacama, Chile. Capitalization 6,000,000 pesos. Lands, under development at last accounts, are in the Inca and Tres Puntas districts of Chañaral.

CHAÑARAL; SOCIÉTÉ DES MINES ET USINES

DE CUIVRE DE.

CHILE

Office: 94 Rue de la Victoire, Paris, France. Mine and works office: Chañaral, Atacama, Chile. Eugène Renevey, chairman; preceding officer, D. Bethmont, A. DuBois, A. Delattre, Georges Renevey and A. Lavagnino, directors. Organized July 17, 1906, under laws of France, capitalization \$6,000,000, increased, 1910, to \$7,000,000, shares \$500 par.

Lands, 661 hectares, including 216 mines and mining claims, the more important being Los Pozos, Las Animas, El Salado and Pueblo Hundido, at distances of 25 to 52 kilometers from the smelter at Chañaral, with which the mines are connected by rail. Property includes lands bought, 1906, of Besa y Ca., and of Las Animas Copper Mining & Smelting Co., Ltd., 1909. Lands are desert and water is scarce. The mine water carries salts and water for domestic uses is secured by condensation from the mine water.

Las Animas group includes the Fronton and Progreso mines, which are the principal properties, also La Fortunata mine, 430' deep, opened 1855, and La Elena mine. The Mina Fronton, worked for decades, carries large orebodies having 3 veins with parallel strike and dip of 70°, in syenite, traceable 3 kilometers. Average width of the 3 veins is about 5', with ore occurring mainly in vertical shoots, sometimes 100' in depth. Oxidized ores, to depth of 150 meters, are succeeded by sulphides, mainly with chalcopyrite, with a little chalcocite, of 6.6% average copper tenor. The mine is opened to a vertical depth of 1,837', and horizontally for about 1,000'. The hoist is old, raising 1,000-kg. cars.

El Progreso mine, opened to depth of about 300 meters, carries mainly chalcopyrite, of about 7% average copper tenor. El Progreso and El Fronton mines are separated by about 50 meters of porphyry, quartz and limestone, carrying orebodies, developed by a tunnel, started from the 6th level of El Progreso, toward El Fronton.

El Manto Verde mine at Los Pozos, 25 kilometers from Las Animas, has 2 parallel orebodies in porphyry and syenite, 1 carrying oxidized ores of about 6% average copper tenor, there being no sulphides, though chalcopyrite is found in the Laura mine, nearby. There are shafts of 80 meters and 195 meters depth, latter having its first 65 meters vertical and balance at 50°, and there also is a tunnel. The mine has extensive and erratic old workings and shows large bodies of low-grade ore, somewhat refractory.

In addition to the foregoing mines, which are the principal properties, there is La Descubridora mine, formerly an important producer, abandoned at depth of 650 meters; the Andacollo mine, with ore averaging about 12.6%; the San Agustín, with 3.5% ore, and the Manto Atacama, with 3% ore. With further development the properties of this company can furnish a sufficient variety of ores to permit proper furnace mixtures.

There is a small concentrator, with steam power, at the Fronton mine.

There are 2 smelters, at Chañaral, known as the old and new, the old smelter, of small capacity, having two 54" circular water-jacket blast furnaces, in poor condition, with Connersville and Böcker blowers, and 6 reverberatory furnaces, each 18' in length, with a trapiche.

The new smelter has 4 reverberatory furnaces and a 100-ton water-jacket blast furnace, with hot blast, and 2 Connerville blowers, three 52-h. p. engines, and an electric light plant. Distilled sea water is used for the water-jackets and boilers. Slags are granulated and hauled out in wooden cars by mules. Losses through fumes, dust and slag are very heavy, aggregating 1.2% copper. Fuel is Australian coke with charges averaging 13.06%, in 1908.

Product of the smelter is matte, averaging 52% copper, which is shipped to Guayaquén for conversion. The smelter has a complete converter department, to be used when production reaches 200 metric tons monthly. The converter department, taking crushed matte, has four 2x1.7-meter shells, with a Walker air compressor, Blake crusher and lining mill.

The property of Las Animas Copper, Mining & Smelting Co., Ltd., taken over July 1, 1910, included a shipping pier, at Chañaral, with railroad line.

Production about 5,000,000 lbs. fine copper annually. Property considered valuable and management good.

CHANAARCITOS; FUNDICIÓN DE.

CHILE

Owned by Sociedad de Minas i Fundiciones de Carrizal.

CHESHIRE COPPER MINES, LTD.

ENGLAND

Office: Timlings, 13 Finsbury Circus, London, E. C., England. Organized June 22, 1912, capitalization £60,000, shares £1 par. Company deals in mining properties.

CHILE COPPER CO.

CHILE

Office: 165 Broadway, New York. Daniel Guggenheim, pres.; Albert C. Burrage, vice-pres.; preceding officers, Murry Guggenheim, Isaac Guggenheim, S. R. Guggenheim, Simon Guggenheim, Pope Yeatman, William Loeb, Jr., John N. Steele, Albert C. Burrage, Jr., Russell Burrage and William J. Maloney, directors. C. K. Lipman, sec.; L. Friedrich, treas. Organized April 16, 1913, under laws of Delaware, capitalization \$110,000,000, shares \$25 par; issued, 3,800,000; 600,000 shares held in treasury for conversion of \$15,000,000 7% gold bonds. Company owns the entire issued capital stock of the Chile Exploration Co. of New Jersey and its Chilean properties are described under that title.

CHILE EXPLORATION CO.

CHILE

Office: 165 Broadway, New York. Daniel Guggenheim, pres.; Albert C. Burrage, vice-pres.; Pope Yeatman, managing director; preceding officers, Murry Guggenheim, S. R. Guggenheim, Simon Guggenheim, Isaac Guggenheim, William Loeb, Jr., John N. Steele, Albert C. Burrage, Jr., Russell Burrage and Clarence L. Myers, directors. L. Friedrich, treas.; C. K. Lipman, sec.; Fred Hellmann, mgr. Organized Jan. 11, 1912, under laws of New Jersey, capitalization \$1,000,000, shares \$100 par.

Property, at Chuquicamata, in the province of Antofagasta, Chile, about 1 mile from the terminus of a branch line of the Antofagasta railroad, is situated on the crest of a low ridge some distance from the main range of the Andes. The orebody is 8,000' long, has a 700' maximum width, and is as yet unproven in shape and extent. Small veins of rich ore cut through the mass, but the average of the entire deposit is estimated at 2.70% copper. The copper occurs in the form of brochantite, a mixture of copper sulphate and copper hydrate, known as a sub-sulphate of copper. There is also a small amount of atacamite and chalcantite, or natural blue vitriol.

Development is by a large number of churn drill holes, which average 404' in depth, most of them stopped in ore. The deepest hole is 1,013' deep. These drill holes show that the oxidized ore changes in depth to an altered

grano-diorite, carrying disseminated chalcocite, bornite and chalcopyrite. About three-fourths of the ore developed consists of brochantite and the balance of copper sulphides.

Ore developed to July, 1913, amounts to 95,657,000 tons of 2.70% copper, according to Pope Yeatman's report.

The reduction plant will treat 5,000 tons a day, being the first unit of a much larger plant to be built later. The copper will be recovered by a leaching process, the ore being peculiarly amenable to treatment by this method. Careful study of the problem by E. A. Cappelen Smith shows that the ore gives little or no slime, and is readily soluble in an 8 or 9% solution of sulphuric acid. As it contains no arsenic, antimony or bismuth, the solution will not be fouled by repeated use. Precipitation will be by electric current, making electrolytic copper direct from the solution.

The ore body will be mined by steam shovel, hauled to the reduction plant and subjected to crushing in gyratory crushers and rolls to one-fourth-inch size. It will then be distributed by Robins conveying belt to concrete vats, lined with acid-proof material and holding 9,000 tons each, a day's supply. The extraction process, which might be more accurately termed soaking, rather than leaching, will take from 2 to 3 days for acid treatment and washing, 1 day for filling and 1 day for discharging. The pregnant solution will be drawn off into solution tanks and the leached residue taken from the vats by clam-shell buckets, operated on a traveling bridge, transferred to conveyor belts and piled on the waste dump. The copper solution will be drawn into precipitation tanks and deposited electrolytically. A power station will be erected at the coast and the contract for the plant has already been let to Siemens & Schuckert, of Germany, for \$2,856,000. Power will be generated by steam at a central station, transmitted by 3-phase current of 100,000 volts, a distance of 120 miles to the mine. Four turbo-generators, each of 10,000-kw., will be installed at the station to be reinforced later by a water power plant on the Loa river, near the mine. The power line will consist of 2 parallel wires of 3x95 sq. mm. cross-section placed on steel turrets. The first unit of the plant for the sub-station at the mine will consist of 4 transformers, each of 10,000-kva. and 5,000-v. with 7 direct-current motor generators of 2,500-kw. each. It is estimated that the plant will be ready to ship copper early in 1915.

Estimated annual production of copper on a basis of 5,000 tons per day is 90,000,000 lbs. refined copper, but the plant will be increased to 10,000 tons capacity in the near future, which should produce 180,000,000 lbs. copper. The estimated cost of production per pound of refined copper is 6 cts., including delivery in Hamburg, Germany or England.

CHILENA DE FUNDICIONES; SOCIEDAD.

CHILE

Office: Valparaíso, Chile. Mine office: Tamaya, Ovalle, Coquimbo, Chile. Works offices: Guayacán, Coquimbo, Chile, and Tongoy, Ovalle, Coquimbo, Chile. Property includes the Tamaya mines, opened 1860, which were the principal producers, also mines at Punitaqui and La Laja, in the province of Coquimbo. La Teresa mine, at Mantos Blancos, produced 1,200 metric tons of 9% ore in 1909. Property also includes the Portozuelo mines. Mines as a whole are said to have an abundance of ore of 5 to 6% copper tenor, available for leaching.

Property includes 2 smelters, known as the Tongoy and Guayacán, also a leaching plant at Guayacán, with a capacity of 100 metric tons of ore daily.

The Fundición de Guayacán is one of the largest copper smelters in Chile, and formerly had 20 very small calcining furnaces and 14 very small reverberatory furnaces, 4 of latter being used for casting ejes, or matte, of

about 50% copper tenor, 8 for Chile bars of 97% average tenor, and 2 for ingots of 99.5% tenor, slags averaging only 0.4% copper. In 1909 this plant was improved by the building of a large reverberatory furnace. Fuel is domestic coal, from Lebu, and a limited amount of Australian coke.

The Fundición de Tongoy has 5 calcining furnaces and 2 reverberatory smelting furnaces, 16x22' in size, making matte of about 57% average tenor, and Chile bars of 97% tenor, sent to Guayacán for smelting. This plant has been idle since 1907.

CHILLAGOE, LTD.

QUEENSLAND

Secretary: C. L. Hewitt, 39 Queen St., Melbourne, Australia. English office: Palmerston House, London, E. C., England. Mine and works office: Chillagoe, Lynd Co., Queensland, Australia. Jas. Smith Reid, chairman; D. W. Harvey Patterson, vice-chairman; preceding officers, V. J. Saddler, H. F. C. Keats and Col. F. G. Hughes, directors; Edwin Habben, London, sec.; E. J. J. Rodda, mine supt.; Jos. Horsburgh, smelter supt.; P. M'Dermott, railway supt.; E. A. Weinberg, cons. engr.

Organized, 1913, under laws of Queensland, capitalization £600,000, shares 10s. par; fully issued, 7s. paid. The Chillagoe Proprietary, Ltd., organized June 16, 1898, was reorganized as the Chillagoe Railway & Mines, Ltd., again reorganized 1902 as New Chillagoe Railway & Mines, Ltd., reconstructed for the third time as Chillagoe Company, Ltd., and again reorganized, 1913, under present title.

The last reconstruction was for the purpose of raising funds to develop the company's coal properties at Mount Mulligan, 30 miles to the northeast of the mine. It involved an assessment of 3 shillings on each of the 1,175,000 shares of 10s. each.

Debentures: £573,300, first mortgage 5% bonds due April 1, 1919; £225,000 Etheridge Railway, 4½%, first mortgage bonds, redeemable at par March 1, 1921, and £20,000, second mortgage 6% bonds redeemable in 4 annual drawings.

Profits for fiscal years ending March 31, have been as follows: £64,900 in 1908; £94,507 7s. 2d. in 1909; £88,348 4s. 1d. in 1910; £99,826 1s. 11d. in 1911, and £18,202 3s. 1d. in 1912. Deficiency coupons for debenture interest are £9.

Lands, 5,540 acres, including the Einasleigh mine and 2,016 acres, 50-year leasehold from the crown, exempt from labor conditions under special act of the Queensland parliament, and an 80-acre smelter site, all in the Walsh & Tinaroo district, concessions including 9 groups of 70 leases, expiring Jan. 1, 1948, held at annual rental of £1 per acre, with exemption from labor conditions, and 6 original leases. Property also includes about 3,200 acres of coal land at Mount Mulligan.

The district shows Silurian limestone, sandstone and conglomerates, with various fissure veins and contact deposits, carrying auriferous copper ores giving average returns of 3.5% copper and 2 oz. silver per ton, with traces of gold and lead ores ranging in tenor about 20% lead, 8% zinc and 2 oz. silver per long ton. Principal mines are the Einasleigh, the Eclipse, Paisley, Ruddygore and Zillmantion, minor properties being the Penzance, Muldiva and Mount Lucy mines.

The Einasleigh mine shows quartzite, quartz-porphyry, schist, slate, syenite and metamorphosed acid granites, traversed by diorite dikes, overlaid by 40' of basalt, carrying 3 contact deposits that are essentially mineralized quartzites, adjoining the diorite rock. The orebody under development, estimated to average 35' in width, carries malachite, azurite, melaconite and spongy native copper, at and near surface, succeeded by chalcopyrite and chalcocite. The ores carry a trace of silver, but no gold.

The mine is opened beneath the Einasleigh river, with a 40' roof of ore remaining for safety. Development is by the Daintrees shaft of 30', South shaft of 120', and Main shaft of 390', with levels at 120', 170', 270', and 370', the lowest level showing a 23' vein. Mine is timbered on the "pigstye" system, using coarse waste and river sand for filling. Some diamond drilling has been done. Ore reserves were estimated, 1913, at 71,242 tons, carrying about 5% copper, with small silver and gold values.

Equipment at the mine includes a 200-h. p. steam plant, with a 4x6" single-drum hoist, and a 14x30 first-motion duplex hoist with two 6' drums. There is a 6-drill Riedler air compressor and a 15-kw. direct-connected engine and generator. There are 14 buildings, including an office, laboratory, store, sawmill and dwellings.

The Ruddygore mine apparently works an orebody best described as a stockwerk, worked largely open-cast, deepest shaft, 300', being bottomed in low-grade ore. Equipment includes an 8x12" hoist and a 6-drill air compressor. Idle.

The Zillmanton mine has a vein of 17 to 20' width, opened by old shafts of 250' and 360', and the new Reid shaft sunk 376'. Ore produced, 1912, returned 4% copper and 1.38 oz. silver per long ton. Mine was flooded, 1908, and reopened, 1910, but continues wet.

The Penzance or Red Cap mine, now idle, has a 200' shaft.

Miscellaneous mines include the Hensey, having a 200' shaft; the Dargalong mine, which shows auriferous copper and lead sulphides; the Otho, which has proven disappointing in development; the McIlwraith, having a 250' shaft, idle; the Victoria, having a 600' shaft, idle; the Harper, which has a 368' shaft, idle; also the Hobson and Ti Tree mines, both idle. Iron ore for flux is mined at the Boomerang and Mount Lucy mines, and limestone quarried at Mount Lucy.

Equipment includes steam plants at the principal mines, with 6 hoists, good for 500' each, and several air compressors. Buildings include a 50x70' wood and iron machine shop, 50x70' carpenter shop and smithy, a small iron foundry, 5 other mine structures and 11 dwellings.

The smelter, at an average distance of 4 miles from the different mines, receiving ore by rail, is a very complete plant, costing upwards of £60,000, and doing an extensive custom business. The plant has 3 Edwards calciners and eight 140-ton blast furnaces, 3 for lead and 5 for copper, also a reverberatory furnace. The lead smelter uses the Huntington-Heberlein sintering process, with 8 pots. The lead furnaces treat Mungana and other custom ores, the copper in the ores being matted and afterwards smelted in the copper furnaces. The complex sulphides are divided into 3 lots, as straight copper ore, copper-lead ore, where the copper is practically discarded, and silver-lead-copper ore, with recovery of all 3 values in latter. The converter department has 1 stand, with 6 shells, taking 35% copper matte from the blast furnaces, and turning out blister copper averaging 98% copper and about 100 oz. silver per long ton. The converter department has an electric crane, and pneumatic tamper for linings. Fuel is wood, coal and coke, and water is taken from a 1,500,000-gal. dam, across Chillagoe creek, which has a minimum flow of 4,000 gals. hourly. The smelter has electric power, a small sampling mill, with crusher and Ball mill, and a Dwight-Lloyd sintering plant, installed, 1911.

The Mareeba to Chillagoe railway, owned by the company, has 270 miles of track; apparently this railway is the only profitable branch of the business at present.

Production, including custom ore, which supplied the bulk of the product, for fiscal years ending March 31, has been as follows: 2,966 tons copper,

6,703 tons lead, 786,692 oz. silver and 159 oz. gold in 1909; 2,736 tons copper, 2,253 tons lead, 437,449 oz. silver and 1,798 oz. gold in 1910; 3,272 tons copper, 2,396 tons lead, 512,625 oz. silver and 11,646 oz. gold in 1911; 1,845 tons copper, 1,410 tons lead, 197,886 oz. silver and 2,286 oz. gold in 1912. The smelter treated an average of 1,800 tons per week during June and July, 1913, producing 1,234,240 lbs. fine copper, 675 tons pig lead, 68,448 oz. silver and 707 oz. gold.

CHOQUELIMPE; SOCIEDAD EMPRESA MINERA y FUNDICIÓN DEL MINERAL DE.

CHILE

Mine office: Choquelimpe, Tacna, Arica, Chile. Carlos Basadre Forero, mgr. Organized 1908, as successor of Compañía Beneficiadora de Metales. Mine has an irregular orebody in rhyolite, carrying cupriferous pyrite, with quartzose gangue, and the company apparently is operating mainly on extensive old dumps of low-grade copper ore.

The reduction works, 160 kilometers from the port of Arica, with the high freight charge of 50 pesos per metric ton, include a small mill and smelter. The mill, built 1909, has 2 Blake crushers; a 40" Huntington mill, 1 jig, 2 Wilfley tables and 1 Ferrari table. The smelter has 2 calciners and a 36" cylindrical water-jacket blast furnace, with 2 blowers and a 50-h. p. boiler. Fuel is English and domestic coke and yareta is burned under the boilers. Product is Chile bars carrying good gold and silver values.

CHORRILLOS SMELTER.

CHILE

Owned by Compañía de Minas i Fundición de Calama, at Calama, Antofagasta, Chile.

CHOTA NAGPUR MINES.

INDIA

Mine office: Chota Nagpur, Bengal, India. Ore occurs as chalcopryrite, disseminated in schistose rocks. Mines were worked in very ancient days, and a company did some development work in 1903. Negotiations for re-opening said to be in progress, 1913.

CHRISTIANIA NICKEL REFINING WORKS.

NORWAY

See Kristianssands Nickkelraffineringsverk.

CHUQUICAMATA; SOCIEDAD ESPLOTADORA DE.

CHILE

Office: Valparaiso, Chile. Mine office: Calama, Antofagasta, Chile. Organized Aug. 7, 1900, under laws of Chile, capitalization £40,000, and re-organized Jan. 18, 1904, capitalization £100,000, shares £2 par. Property is the San Luis mine, said to have produced about 6,000,000 pesos worth of rich ore. Is supposed to have sold its holdings to the Chile Exploration Co.

CINTILLA COPPER MINING CO., LTD.

BOLIVIA

Address: care H. Gibbs, sec., 21 Wall Exchange, London, E. C., England. J. J. C. Fernau and G. H. Fernau, directors. Organized Sept. 20, 1912, capitalization £2,500, shares 1s. par; issued, 37,500 shares. Debentures, £1,250 bonds bearing 10%; issued, £575. Property is a leasehold of 40 hectares, in Chui Chui, Viccboca, Norchicas, Potosi, Bolivia, known as the New Coro Coro. No trace of operations secured.

CLAUSTHAL; KÖNIGLICHE HÜTTENAMT.

GERMANY

Works office: Clausthal, Hanover, Germany. Herr Bergrat Boltze, mgr. Property is a silver-copper smelter operated under state auspices.

CLONCURRY COPPER & GOLD EXPL. CO., LTD.

QUEENSLAND

Office: Darragh's Bldgs., Queen St., Brisbane, Queensland, Australia. Letter returned unclaimed from former English office, 39 Lombard St., London, E. C., England. Mine office: Cloncurry, Beaconsfield Co., Queensland, Australia. D. T. Seymour, J. Blanc, G. Whittington, F. G. Exell and W. R. Keith, directors; P. W. Crow, sec.; F. H. Hockings, mine mgr., at last accounts. Organized Jan. 22, 1906, under laws of Queensland, capitalization £50,000, shares 5s. par, fully issued and fully paid. Lands, ap-

parently are 160 acres, and property merely a prospect. Is regarded with suspicion as a mere stockjobbing scheme. No trace of operations secured.

CLONCURRY SYNDICATE, LTD.

QUEENSLAND

Office: 541 Salisbury House, London, E. C., England. Mine office: Cloncurry, Beaconsfield Co., Queensland, Australia. F. C. D. Haggard, chairman; A. B. Dealtry and F. B. Dunsford, J. P., directors; F. A. Labouchere, sec. Organized June 14, 1906, under laws of Great Britain, capitalization £50,000, shares £1 par; issued, £46,650, fully paid. Paid a 5s. dividend, Dec., 1907. Property is 49,967 shares in the Queensland Exploration Co., Ltd., and a loan of £24,086 due from that company, which was floated by this corporation.

COBAR COPPER, LTD.

NEW SOUTH WALES

Office: 308 Winchester House, Old Broad St., London, E. C., England. Mine office: Cobar, Robinson Co., N. S. W., Australia. A. E. Barton, chairman; preceding officers, C. J. McMahon and F. H. Aarons, directors; H. A. McMahon, sec. Organized Nov. 16, 1909, under laws of Great Britain, as a reconstruction of Cobar Copper Co., Ltd., with capitalization £30,000, shares £1 par.

Lands, 150 acres, including the Mount Pleasant and Young Australia mines, lying between the Cobar-Chesney and Oriental. A vein of about 4' width carries mainly manganiferous quartz, with patches of copper sulphides of fair grade. The middle vein is about 8' wide, and there is a belt up to 300' in width, of slate and quartz, carrying copper impregnations. The Mount Pleasant mine has a 520' shaft, with levels at 150', 215', 315' and 500'; and the Young Australia mine has a 370' shaft. Properties were first worked as gold mines, on the gossans, returning about 6 dwts. per long ton, but below the zone of oxidation copper increased gradually rendering the cyanide extraction of gold difficult. Idle for first 9 months of 1912, but unwatered mine in October and drove 500' level 115' further toward orebody now being worked in the Young Australia mine by leasers. Latter mine was developed on the 350' level and produced 730 tons of ore yielding £2,390.

COBAR FREEHOLD COPPER MG. CO., N. L. NEW SOUTH WALES

Mine office: Cobar, Robinson Co., N. S. W., Australia. Organized 1907, under laws of New South Wales, capitalization £15,500, shares 10s. par. Lands, about one-half mile from the Great Cobar, are slightly developed by a shallow shaft showing malachite and azurite. Idle and presumably moribund.

COBAR-GLADSTONE MINING CO.

NEW SOUTH WALES

Mine office: Wrightville, Robinson Co., N. S. W., Australia. Mine is opened by a 260' vertical shaft and makes occasional shipments to the Great Cobar smelter, first-grade selected ore assaying about 25% copper, second-grade ore assaying 10% copper, and third-grade ore assaying 5% copper. Property also carries gold.

COBRIZAS; MINA.

BOLIVIA

Office and mine: Lipez, Potosí, Bolivia. Is a small producer of native copper, making more or less silver as a by-product, both metals being found native and in association and for some years has been the largest Bolivian producer of native copper outside of the Coro Coro district.

COCKBURN MINING CO., N. L.

SOUTH AUSTRALIA

Idle. Mine office: Cockburn, South Australia. Mine, formerly known as the Mutooroo West, about 2 miles west of the Mutooroo mine, has a vein with nearly north-south strike, dipping sharply to the west, and 2 shafts, about 200' apart, the No. 1 or Engine shaft, 150' deep, showing a vein of about 22' width, carrying patches of rich chalcopyrite and large

quantities of pyrite, with scanty quartz gangue. No. 2 shaft, 157' deep, shows ore of only about 1% copper tenor. Equipment includes a good hoist.

COLEBROOK PROSPECTING ASSOCIATION, N. L. TASMANIA

Office: 60 Cameron St., Launceston, Tasmania. Mine and works office: Rosebery, Montagu Co., Tasmania. J. S. Clemons, M. P. P., chairman; preceding officer, E. M. King and A. Simson, directors; E. Sheargold, sec. Capitalization originally was £57,600, increased, 1908, to £67,200, shares 14s. par. Lands, 240 acres, 1 mile south of Rosebery, showing 3 orebodies, the Summit No. 3 lode, of 18' width, ore carrying chalcopryite very sparingly, associated with pyrite, in a schistose gangue. Mine was worked open cast, with 3 pits, and had a 1,000' gravity tram.

The 50x60' smelter, costing £7,000, has a 200-ton water-jacket blast furnace, which was in blast only 120 hours. Ore was claimed by management to average 3% copper, after careful sampling, but smelter returns were under 1% copper, and 800 long tons of ore smelted yielded only 6¾ tons of copper. Mr. Cecil Rae, the former smelter superintendent, condemned the mine as worthless, and was abused, by the directors, for telling the truth. Idle since May, 1908, company in debt, reputation gone and bankruptcy ended its existence.

COLLBRAN-BOSTWICK DEVELOPMENT CO. KOREA

Office: First National Bank Bldg., Denver, Colo. Mine office: Kapsan, Hani Kyung, Korea. A. R. Weigall, gen. mgr.; H. Collbran, pres.; H. R. Bostwick, vice-pres.; H. E. Collbran, sec.-treas.; preceding officers, H. Maki and S. L. Selden, directors. Organized April, 1906, in Connecticut, capitalization \$1,500,000; issued \$910,000. Annual meeting, 2nd Monday in July.

Property is a concession of about 4,000 sq. miles, including the old Kapsan mine, granted 1908, by the Korean government; the concession, to run for 100 years, dating from June 17, 1908, allows the company the free use of timber for all mining purposes upon payment of nominal rates, and among other rights includes free importation of all mining material and free export of the mine products, the government receiving a royalty of 1% of the value of the gross output, in addition to nominal taxes on the lands held.

The Kapsan mine, about 21 miles east of the walled city of Kapsan, and about 120 miles from the harbor of Peuq-Chhyang, was discovered and opened more than a thousand years ago by a Chinaman, eventually passing to the Korean throne, and, 1883, was worked by the crown, for 2 years, with a maximum force of about 20,000 men. Ore occurs as a metasomatic deposit, the district showing alternations of limestone and marl, with interbedded clay-slate and sandstone, frequently metamorphosed by intrusive granite and overlaid and intruded by basaltic dikes. Ore occurs as large irregular masses of sulphides, mainly chalcopryite, associated with arsenopyrite and pyrrhotite, but without gangue or contact minerals. The deposit now worked is the third that has been found and has an extreme width of 20' and known length of 80', with fairly defined walls.

Development work by the present company started July, 1909, has placed about 160,000 tons of ore in sight, said to average 10.5% copper, about 5,430' of new openings being made in 1910, at a cost of \$2.30 per foot. The mine has several shafts, deepest being 1,020' below the outcrop of the vein. Company, 1913, planned to erect a 100-ton smelter at an estimated cost of \$170,000.

COMBARBALÁ; COMPAÑÍA MINERA DE. CHILE

Mine and works office: Combarbalá, Coquimbo, Chile, and Illapel, Coquimbo, Chile. Organized Oct. 31, 1906, under laws of Chile, capitalization

400,000 pesos, shares 25 pesos par. Smelter, known as the Fundición de Valdivia, makes Chile bars, of about 98% average copper tenor. Idle and presumably moribund.

COMMERCIAL CORPORATION, LTD.

SPAIN

Office: 4 Union Court, London, E. C., England. Operating office: Pelayo 2, Barcelona, Spain. Mine office: Huercal-Overa, Almería, Spain. Albert F. Calvert, chairman; preceding officer and W. Stuart Lane, directors; Henry N. Gardiner, sec. Organized May 10, 1897, under laws of Great Britain, capitalization £500,000, shares £1 par, in £6,000 deferred shares and £494,000 ordinary shares; issued, £4,100 deferred and £302,000 ordinary shares. Property is the Huercal mine, carrying copper, cobalt and nickel ores, on which company apparently has done a little development. Presumably idle.

COMMODORE MINE.

QUEENSLAND

Mine office: Warroo, Bentinck Co., Queensland, Australia. Development is by a 74' shaft showing high-grade copper ore, selected material, shipped during last quarter of 1912, yielding 16% copper. Mine is leased by Messrs. Moet and Clarke.

COMPAÑIA DE MINAS DE COBRE DE GATICO.

CHILE

See description under Gatico; Cia de Mines de Cobre de.

COMSTOCK MINE.

TASMANIA

Mine office: Gormanston, Montagu Co., Tasmania. Chas. E. Coote, supt., at last accounts. Mine, on the western slope of Mt. Lyell, has 2 tunnels, in schist showing impregnations of chalcoppyrite. Was developing with a force of 10 men, late 1910. Presumably idle.

CONCORDIA DE COLLAHUASI; COMPAÑIA MINERA.

CHILE

Mine office: Collahuasi, Tarapacá, Chile. Organized March 17, 1906, under laws of Chile, capitalization 120,000 pesos, shares 100 pesos par. Property was the Concordia mine, undergoing development, 1910. Presumably idle.

CONDORIACO; COMPAÑIA MINERA DE.

CHILE

Idle. Mine office: La Serena, Coquimbo, Chile. Equipment includes a small steam plant, and the mine was a limited producer, 1903, when about 75 men were employed.

CONGO FRANCAIS; COMPAGNIE MINIERE DU. FRENCH CONGO

Office: 19 Rue de Bonnel, Lyons, France. Mine office: Mindouli, par Brazzaville, French Congo. Organized June 20, 1905, under laws of France, capitalization f770,000, increased 1909, to f4,000,000, shares f500 par, and 7,000 founder's shares carrying the right to 35% of profits. Property is 6 mineral permits, area 14,500 hectares, covering the Mindouli, M'Passa, Tchicumba, Pimbi and Asigunga mines and prospects, also the right to explore in the basin of the Niari river, between Brazzaville and the coast. Company owns in fee simple a strip 96 miles long and 6 miles wide.

Principal property is the Mindouli mine, in the Bouenza district of the upper Kiulu river, about 300 kilometers from Loango, on the coast. The ore deposit shows cupriferous sandstone overlying limestone, surface ores being mainly malachite, with some cuprite, both argentiferous, but at little depth ore changes to chalcocite. These deposits were worked by the natives, in a primitive way, for centuries, and a considerable trade once existed in copper and copper utensils, but this became extinct with French occupation. The ores shipped consist of almost solid copper glance and average 50% copper.

A 24" narrow-gauge railway, 96 miles long, completed Dec., 1910, from Brazzaville to the Mindouli mine, permits development and extraction of ore under favorable circumstances. Transportation of ore is by rail from the

mine to Brazzaville, thence in boats down the Congo river to Leopoldville, thence by railway to Matadi and the coast. The ore deposits are extensive and of good average value. Property considered promising.

CONGOLAISE; SOCIÉTÉ MINIERE.**FRENCH CONGO**

Address: care Nagelmackers & Co., Paris, France, and Brussels, Belgium. Organized 1911, under laws of Belgium, capitalization f1,000,000, subscribed by Jose Allard & Co., Nagelmackers & Co., and Cia. Comm. et Minière du Congo Belge, to acquire and work 2 blocks of mineralized land, amounting to 40,000 hectares, situated in the Upper Katanga River region, which had previously been prospected for the Nagelmackers Co. by a party under the leadership of M. Lefevre.

COOKSON & CO., LTD.**ENGLAND**

Address: F. Reid, sec., Milburn House, Newcastle-on-Tyne, England. Clive Cookson and Hugh Cookson, directors. Organized Dec., 1904, capitalization £250,000, shares £10 par; issued, 21,780 shares. Debentures, £91,700. Property comprises lead and copper smelters and refineries at Willington Quay and Howdon, Newcastle-on-Tyne.

COOSHEEN MINERALS, LTD.**IRELAND**

Probably dead. Office: 5 Great Winchester St., London, E. C., England. Mine office: Schull, County Cork, Ireland. Robt. Snare and Thos. Williams, directors; Thos. Williams, Jr., sec., at last accounts. Organized May 10, 1906, under laws of Great Britain, capitalization £25,000, shares 5s. par; issued, £20,000, fully paid. Property is a 60-year lease, from March, 1906, at yearly rental of £30 and 30% royalty on net profits, of the Coosheen mine, area 329 acres. Mine formerly a copper producer of merit, was reported upon favorably by J. Andrew Wauchope.

COOTAMUNDRA MINE.**NEW SOUTH WALES**

Mine office: Cootamundra, Bland Co., N. S. W., Australia. Property, formerly known as the Mount Felstead copper and silver mine, is 7 miles northwest of Cootamundra. Country rock is quartz-felsite, much crushed, carrying quartz veins with ferruginous jointings, with an orebody of 1 to 6' width, about a quarter of which is ore, including cuprite, melaconite, azurite, malachite and chalcopryrite, also lead carbonates and sulphides and sphalerite. Ore is decidedly argentiferous, selected ore ranging about 50 oz. silver per long ton, with traces of gold. Development is by shafts of 25', 52' and 145'. Production, 1907, was 85 long tons of ore, shipped to Swansea for reduction, giving an estimated yield of about 100,000 lbs. fine copper, with considerable silver values. Idle.

COPPER CREEK MINING CO., LTD.**TASMANIA**

Idle. Mine office: Ulverstone, Devon Co., Tasmania. Lands, 40 acres, freehold, 12 miles from Ulverstone, near Gunn's Plains. The property shows a series of parallel bands of gossan overlying cupriferous calcite, in slate. Development includes trenching, a small open cut and 2 tunnels, lower of 280'. The 62' upper tunnel cuts obliquely a vein of about 5' width, of brecciated silicious slate, carrying covellite and chalcopryrite, associated with pyrite, and reported to be associated with hematite also. Ore samples have assayed 25% copper and 9 oz. 6 dwts. silver per long ton.

COPPER ESTATES OF WESTERN AUSTRALIA, LTD. AUSTRALIA

Address: care J. Barrie, chairman and sec., 78 Lowther St., Carlisle, England. Preceding officers and W. F. Smith, directors. Organized March 4, 1903, under laws of Great Britain, as a reconstruction of a company of same name, which in turn succeeded the Derby Syndicate, Ltd., capitalization £15,000, shares 5s. par; issued, 25,974 shares, fully paid. Lands, 1,050 acres, freehold, opened by shafts, said to have a 30' vein with 10 to 12" pay streaks on both walls, carrying high-grade black copper, presumably

chalcocite. Mine was discovered 1882, and worked for several years. Idle since 1904.

COPPER HILL MINE.

SOUTH AUSTRALIA

Mine office: Kadina, Daly Co., South Australia. Mine, known as the Kulpapa, opened in early days, is about 12 miles from Kadina, showing a vein about 60' wide, carrying nodules of malachite, and ferruginous streaks, with a gritty friable kaolinized gangue. The 250' main shaft is sunk vertically for 90', and thereafter on the dip. There are a number of old pits and shafts. Equipment includes steam power and a hoist good for 400'. Idle several years.

COPPER MINES OF COPIAPO, LTD.

CHILE

Address: W. S. Bartlett, sec., 80 Bishopsgate, London, E. C., England. Mine and works office: Copiapo, Atacama, Chile. H. Loeffler and F. Merriks, directors. Organized June 18, 1912, as successor of Copiapo Mining Co., Ltd., capitalization £10,000, shares £1 par. Property consists of a tract 15 miles long in the valley of the Copiapo river, Atacama province, and of the Dulcinea and Ojancos copper mines.

The Dulcinea mine, 12 kilometers from Púquios, opened 1854, is the deepest mine in Chile. The mine has a fissure vein in diorite, occasionally faulted, of about 22' average width, with a footwall pay streak called the East vein, and a hanging-wall pay streak called the West vein, separated by 15 to 20' of barren rock. Gangue is quartz and calcite, with some iron oxide, and the vein is oxidized to about 1,000' and even to 1,500' in depth, the oxidized zone being succeeded by about 300' of secondary bornite and chalcocite, followed, below an average depth of about 1,350' by chalcopyrite. Ores carry both gold and silver values and the mine shows almost everything from native copper above to massive chalcopyrite at depth, the changes being gradual. Notwithstanding its great depth the mine produces only small quantities of water and water is brought to the mine by aerial tram from Llanos de Varas. The deeper workings are very warm. Electric light is used underground. The mine has met with many accidents and has suffered twice from incendiary fires. The Fletcher or main shaft is 2,880' in depth and has not been deepened since 1904. The Weir shaft is an incline 2,100' deep. A 1,070-meter drift tunnel has its portal 250 meters from the Weir and 410 meters from the Fletcher shaft. The Dulcinea employs an average of 120 men and produces about 1,000 metric tons of 8% ore monthly.

Equipment at the Dulcinea includes a Fraser & Chalmers hoist at the Weir shaft and a hoist at the Fletcher shaft raising 1,000-kg. cars. A 5,808-meter Ropeways aerial tram, from the Dulcinea mine to Llanos de Varas, connects with a light railway running to the smelter. The aerial tram has 42 triangular towers with longest span of 112 meters and capacity of 5 metric tons per hour. Tram requires only 12-kw. power for operation and cost of transport is about 3 pesos per metric ton.

The Descubridora mine, in the Checo district, opened 1825, has been idle since 1906.

The Ojancos group, at Ojancos, Atacama, includes the Carmen Alto, San Francisco and Antonia mines. As a whole, this group has proven disappointing and is now idle. The Carmen Alto has a 400' main shaft. The San Francisco has a 350' main shaft, and ore produced, 1905, averaged 16% copper. The Antonio is yet in the development stage. The Republicana, idle some years, was showing poorly when closed down.

The smelter, at Púquios, near the Mina Dulcinea, built 1907, apparently has been worked with interruptions, owing to lack of ore. The plant has a 90-ton 36x120" Fraser & Chalmers water-jacket blast furnace, a Samuelson

rotary blower, dust chamber and steel chimney. The works have electric light and make a limited use of electric power. Slags are hauled out in cars, by hand. Fluxes are limestone and iron ore, and coke charges are about 14%, including loss of coke in transit. Product is matte, exported to Europe. The smelter employs about 40 men.

COPPER QUEEN, LTD.

CAPE PROVINCE

Probably dead. Former mine office: Hay, Griqualand West, Cape Province. Is not listed in S. A. Mining Directory, 1913. See Vol. X, Copper Handbook.

COPPER QUEEN MINE.

SOUTH AUSTRALIA

Office: Beltana, South Australia. Beltana Rapid Ore Treatment Syndicate, owner. Lands, 4 miles west of Beltana, show decomposed slate, with seams of tetrahedrite and cuprite, the whole formation being strongly impregnated with copper carbonates. Development is by numerous open cuts and shallow shafts. Ores average 2 to 4% copper. Presumably idle.

COPPER WELL MINING CO., LTD.

NEW SOUTH WALES

Office: Cobar, N. S. W., Australia. Mine office: Wertago, Yungnulgra Co., N. S. W., Australia. Organized Sept., 1906. Lands, in the White Cliffs district, carry a vein of 24 to 30" width, with nearly vertical dip, having a 150' shaft, with levels at 60' and 100', showing good carbonate ore. About a quarter-mile north of the shaft there are 2 parallel veins of 8 to 12" width, 7' apart, presumably pay streaks of a single vein, carrying high-grade copper ore. Idle several years and apparently moribund.

CÓRDOBA COPPER CO., LTD.

SPAIN

Office: 5 Queen Street Place, London, E. C., England. Operating office: Manriques 9, Córdoba, Sevilla, Spain. Mine office: Estación de Cerro Muriano, Sevilla, Spain. Wm. Frecheville, chairman; Richard E. Carr, agt.; preceding officers, Lord Vaux of Harrowden, J. E. Champney, J. A. Dennison, Edgar Taylor and G. Cornwalls West, directors; F. H. Williams, sec.; John Taylor & Sons, mgrs.; J. Hocking, mine supt. Organized Aug. 5, 1908, under laws of Great Britain, capitalization £200,000, shares 5s. par; issued, 731,564 shares, fully paid. Company is a consolidation of the Cerro Muriano Mines, Ltd., and North Cerro Muriano Copper Mines, Ltd. For year ending Dec. 31, 1911, profits were £14,899, and for year 1912, £32,280; dividends 20%, or £36,578. In 1912, 40,000 additional shares were sold at par, giving £10,000 additional working capital.

Property, 469 hectares, 10 miles northeast of Cordoba, in the south of Spain, held under perpetual lease from the crown. Property is reached by the Andalusian railway. Mines show old workings, dating from the Roman era, extending to a depth of 400', notwithstanding a heavy flow of water. There are 6 large and several small veins in mica-schist, diorite and quartzite, carrying chalcopyrite and pyrite, with gangue of calcite, quartz and country rock, the ground being soft, requiring the filling of stopes with waste. Veins are reported to have widths of 12 to 40', with proven lengths as follows: Calavera, 1,635'; Excelsior, 635'; Lorenzo, 4,575'; Isabel, 5,550'; Cerro Muriano, 8,500'. Some ore taken from the old Roman workings assayed 28 to 34% copper.

Main shafts are the Santa Victoria, bottomed in the footwall at 726' and the San Rafael, 1,410', very wet, intersecting the vein at 870'. The San Rafael shaft, 300 meters from the Santa Victoria, shows a vein of 5 to 13 meters width with the better portions worked out by the Romans. The San Guillermo shaft, 300 meters from the San Rafael, was sunk only 42'. Ore reserves were estimated, Dec. 31, 1911, at 202,514 long tons, averaging 3.59% copper and on Dec. 31, 1912, at 200,025 tons of 3.35% copper. Development for 1912 was 10,236', but new ore opened up did not quite equal extraction.

The concentrator, costing £8,000, was remodeled, 1910. About half of the product is treated by the mill and half by the smelter. The mill has 6 units of the Murex magnetic separation process which treat the re-crushed jig middlings, other flotation processes being unsuitable owing to the presence of calcite. In 1912 Murex plant treated 8,536 tons of reground jig middlings and tailings averaging 1.73% copper and produced 817 tons concentrates averaging 12.8% copper, with a 70% recovery.

The smelter includes a calcining plant. The blast furnace blown in Aug., 1908, makes matte only and is in blast only alternate months, its capacity being double that of the mine. The smelter treated 24,477 tons of ore, concentrates, etc., and produced 4,595 tons of 51.3% matte in 1912.

In 1912 the mine output was 90,159 tons, which was in part hand-picked, with 55,013 tons sent to the concentrator and fines together with concentrate either sintered or briquetted. The production for 1912 was 2,377 tons of blister copper, but 2,439 tons was shipped in that year, yielding £175,914. Present production about 600,000 lbs. copper a month. This property is one of the largest and most interesting of the old Hispana-Roman mines and was famous before the Christian era for the high quality of copper and brass produced from its ore, but was entirely idle for 2,000 years, until reopened, 1903, by the predecessors of the present company.

CORELLA COPPER CO., N. L.

QUEENSLAND

Office: Brisbane, Queensland. Mine office: Cloncurry, Beaconsfield Co., Queensland. Organized 1912, as a reconstruction of the Willcocks-Cloncurry Copper Mines, Ltd. Lands, 85 acres, in the vicinity of Duck creek, including the Jessie, Rosebud, Secret and Melba mines. The Jessie mine has a 175' shaft, with bottom level at 163'; the Rosebud mine has a 200' shaft. Active development was prosecuted in 1912-13, sinking the Rosebud shaft 100' through hard, black schist, carrying disseminated chalcopryrite and also sinking 100' shaft in sandstone on the Secret lease.

A small smelter, with a reverberatory matting furnace only, was built 1907, and blown in 1908, treating a little ore averaging about 20% in copper tenor, after selection, making high-grade matte, but was idle, 1913.

CORIOLAN; GEWERKSCHAFT.

GERMANY

Mine office: Wissen-am-Sieg, Rheinprovinz, Prussia, Germany. Albert Vorländer, agt.; A. Schneider, supt., at last accounts. Capitalization 100,000 shares, without assigned value. Mine, developed by open cuts, tunnels and 1 shaft carries ores of lead, copper, cobalt and antimony, and was a very small producer of these metals, at last report.

COROCORO DE BOLIVIA; COMPAÑIA.

BOLIVIA

Office: Santiago de Chile. Mine office: Coro Coro, La Paz, Bolivia. Organized April 23, 1873, under laws of Bolivia, capitalization 1,025,000 bolivianos. Property, 354 hectares, is the second largest copper mine in Bolivia, employing about 500 men. Mine, 460 meters deep, is opened on conglomerate strata carrying native copper, with occasional cuprite and chalcocite. Silver, which occurs native, with copper, as in the Lake Superior mines, is an important byproduct. Mine has steam power and a mill, product being exported as copper mineral, production ranging 600 to 800 quintals monthly, of barillas de cobre of about 80% average copper tenor, estimated, by the Bolivian government to cost 7.8 bolivianos per quintal.

COROCORO UNITED COPPER MINES, LTD.

BOLIVIA

Registered office: 151 Finsbury Pavement House, London, E. C., England. Main office: 7 Rue des Italiens, Paris, France. Mine office: Coro Coro, La Paz, Bolivia. Baron René de Batz, chairman; G. T. Crane, E. F. Harrington, J. L. Barber, A. Berthín, Noël Berthín, H. M. Kersey, C. Portalis, L. Monnier, and L. Charbonnel, directors; G. B. Wolfe, sec. in

London; Roger Leo, sec. in Paris. Organized Aug. 6, 1909, under laws of Great Britain, capitalization £700,000, shares £1 par; issued, £673,607, fully paid. Company took over the properties of J. K. Child & Co., Ltd.; Sucesión Noël Berthín; Compañía Sud Americana de Cobre de Corocoro, and Carreras Hermanos.

Property comprises 515 hectares at 12,000' elevation, in the Coro Coro district in central Bolivia. The principal mines are the Vizcachani, Santa Rosa and the Guallatiri, the first named formerly owned by J. K. Child & Co., the second by Carreras Bros., and the third by the Noël Berthín estate. The copper is found native in several beds of sandstone interstratified with reddish and brownish shale. The ore-bearing beds occur in 2 series, separated by a strong fault; the beds to the east of this fault are known as ramos and dip east, the copper-bearing strata being succeeded by a considerable thickness of red slates capped by green slates and limestone overlaid in turn by red clay and brown sandstone. The beds west of the fault are known as vetas, or veins, and are much harder than the copper-bearing ramos. The mineralization is not uniform and the native copper occurs in particles scarcely visible to the naked eye, as well as in grains, plates, threads and sometimes flat masses weighing several hundred pounds. The main fault, known as Dorado vein, is also mineralized and is now the main producer of the company, yielding sulphides and arsenides of copper. It is supposed that this fault was the feeding fissure whose solutions spread into the sandstone and was precipitated by organic matter.

The mine workings have not yet crosscut very far into the series, but show at least 4 ramos and 6 vetas, the 4 ramos being divided into 7 cuerpas, or beds, and the 6 veins into 10 to 14 beds. Some of these beds have 7 to 8 meters of homogeneous ore, the White Ramos being 30 meters wide on the 10th level of the Vizcachani shaft, of which 8 meters are mined as ores. The beds average 10 meters workable thickness with an average content of 3½%.

The district is extremely arid, without timber, and almost without shrubs, and extensive use is made of local fuel, which is taquia. Taquia is used for firing boilers and also for drying and roasting ores and in the past even was used for smelting.

The mine openings in the conglomerate strata stand fairly well, though with some crushing, and levels average 25 meters apart. Winzes are inclined, with steps cut. Little timbering is used, except for shafts, owing to its great cost, timber being imported mainly from North America, and the workings are secured principally by the poteo or dry-walling system. Steel is used for arching lateral workings.

The property is divided into 4 operating units, principal and active sections being the Corocoro and the Guallatiri. The Corocoro has a vertical shaft 330 meters deep, equipped with a steam plant, and ore-sorting and crushing plant. The Guallatiri has shafts of 180 and 350 meters.

The ore is treated in 3 mills of 70 tons to 100 tons daily capacity, making a product known as barrilla, or crude copper mineral, of 80 to 88% copper tenor, which is shipped to Europe for refining. Production of the mines, 1912, was 4,100,000 lbs. fine copper. Owing to the remote and almost inaccessible location of these mines, past production has been small, compared with possibilities, but the company is making progress and output is steadily increasing. The property is considered decidedly promising.

CRADDOCK MOOR TIN & COPPER MINES, LTD. ENGLAND

Address: C. A. Lane, sec., 130 Moorgate Station Chambers, London, E. C., England. A. J. Bailly, L. Holmes and S. Fawns, directors. Organized

Aug. 19, 1912, capitalization £5,000, shares £1 par, to deal in copper and tin mining properties in Cornwall.

CRONNEBANNE MINES.

IRELAND

Owned by Ovoca Copper Syndicate, Ltd., at Ovoca, County Wicklow, Ireland.

CROWL CREEK SOUTH COPPER

MINING CO., N. L.

NEW SOUTH WALES

Office and mine: Shuttleton, Mouramba Co., N. S. W., Australia. Property, south of Shuttleton, has a 125' shaft, showing slight copper carbonate stains, but without appearance of commercial ore or a defined orebody. Idle.

C. S. A. MINES, LTD.

NEW SOUTH WALES

Office: 16 O'Connell St., Sydney, Australia. Mine office: Cobar, Robinson Co., N. S. W., Australia. G. H. Blakemore, chairman and managing director; J. O. Armstrong, A. T. Brown, J. T. Lemprière, Dr. Richard Read, Dr. W. H. Read and Peter Snelson, directors; J. N. Yarwood, sec. Organized Dec. 7, 1905, under laws of New South Wales, capitalization increased, 1907, to £60,000, shares £1 par; fully issued. Annual meeting in January. Absorbed, 1907, the C. S. A. Block 10 Mining Co., N. L., an adjoining property.

Report for year 1912 shows net proceeds from ore sold, £4,138, with net surplus £409, which deducted from debit of preceding year leaves debt of £1,808.

Property, 229 acres, leasehold, known as the Cornish, Scottish and Australian mine, 7 miles north of Cobar, in the Boganfield. Claims show sandstones and shales altered in places to slate. The outcrop is a large boat-shaped mass of gossan, oxidized for 400' and underlain by slates carrying bands with disseminated sulphides. A rich deposit of lead carbonate, 40' thick, was found at water level, 457', and this enrichment zone underlain by lean, cupriferous pyrite and pyrrhotite with some blende and galena of later age.

Development consists of a vertical main shaft of 660' and a 460' accessory shaft with extensive workings. New workings in 1911 disclosed a vein of silicious chalcopyrite ore at 450' and, in the nearby Tinto mine, the shaft from 450 to 550' passed through good basic copper ore. This solid basic ore averages about 2% copper, was 66' wide at last reports with considerable 8% ore in places.

Equipment includes a double-cylinder hoist, and 2 single and 2-stage air compressors, of 12 drills aggregate capacity, with boilers for condensing water, the district being arid. There are 8 buildings.

Production, 3,800 tons ore in 1906; 1,200 in 1907; idle 1908 to 1910, but produced 491 tons, valued at £1,259, in 1911.

The mine can be successfully worked for copper if a sufficient tonnage be developed, as the ore is basic.

CULGOA MINES.

QUEENSLAND

Mine office: Kilkivan, Lennox Co., Queensland, Australia. G. Turner, mgr., at last accounts. Lands, on Thunder creek, 15 miles north of Kilkivan, show several 8 to 15" veins, assaying 3 to 24% copper. Ore is shipped to the Waratah smelter. Presumably idle.

CUTTER COVE; SOCIEDAD DE MINAS DE COBRE DE. CHILE

Mine office: Cutter Cove, Magallanes, Chile. Ferdinand Dorion, mgr. Organized May 30, 1906, under laws of Chile, as a reconstruction of Compañía Minera de Cutter Cove, capitalization £400,000, shares £1 par.

Property, 265 hectares, on the west coast of the Brunswick Peninsula, near the northern entry to the Canal Geronimo, about 120 miles from Punta Arenas. Lands, fairly timbered, show prominent quartz gossans and carry

a mineralized zone 3 miles long in diorite and syenite. This zone has a system of lenses parallel, running northeast and dipping southwest. There are frequent fracture planes and displacements, but the lenses average 12 to 25' across and have a genetic connection with the fractures. The ore is a mixture of chalcopyrite and pyrite, occurring in occasional rich pay streaks, but mostly finely disseminated in a quartzose gangue and containing a little galena and sphalerite.

This is the southernmost copper mine of the world. Work begun, 1904, includes several 100' shafts, 1,500' of tunnels and 400' of drifts. The Mina Samuel has an open pit and shallow shaft, carrying 3.9% ore, with some ore assaying up to 18% copper and 0.02 to 7 oz. silver per long ton.

The Mina Alejandro, apparently the most important, has a shaft and 2 tunnels. The Mina Catalana, 800 meters south of the Alejandro, includes the workings of La Plomiza, Catalana and Creston de la Catalana, with 2 tunnels, one of 70 meters. The Mina Sara also has some slight workings. The Mina Vives, on the extreme northeast of the property, has a tunnel on a contact vein carrying chalcopyrite, associated with pyrite, said to assay 7.1% copper, with a rich paystreak. The mine made small test shipments of ore, 1905, returning 16 to 19% copper, with an average of about 7 oz. silver per metric ton, and secured assays up to 22% copper, from selected ore.

The mill, connected by a tram with the Samuel mine, is of 50 tons daily capacity, equipped with a No. 6 Krupp ball mill, of 1 metric ton hourly capacity, 7 Friederich Krupp Grusonwerk oscillating tables, a 6x16' crusher, feeding belt and elevators, operated with a force of 8 men, working 12-hour shifts.

DAIJI MINE.

JAPAN

Owned by Fujita Co.

DAINTREE COPPER MINE.

QUEENSLAND

Situated in Oaks Goldfield district, about 1 mile from the Einasleigh river and 18 miles from Kidston. Mine developed by several shafts showing high-grade ore, 150 tons shipped to the Chillagoe smelter averaging 27% copper, or approximately £20 per ton. Was being worked throughout 1912 by 3 men.

DALY COPPER MINING CO.

NORTHERN TERRITORY

Mine office: Leighs Creek, No. Territory, Australia. F. Sutherland, mgr., at last accounts. Lands, about 6 miles northeast of Yudnamutana, are very rough, having a fissure vein in quartzite, carrying mainly malachite and azurite, with patches and seams of cuprite. Has steam power. Idle several years.

DALY RIVER COPPER MINE.

NORTHERN TERRITORY

Property, situated in the Northern Territory, Aus. Lease expired in summer of 1913 and government resumed control of property, including smelter erected in 1907.

DANIA COPPER MINES.

NATAL

Mine at Undweni, Ngutu, Zululand, Natal. Property, 570 acres, near the Undweni river, about 30 miles from Vryheid, shows a shear zone in granite, 16 to 20' wide, traceable for 2 miles, carrying occasional bunches of fairly high-grade ore and opened by a 215' shaft. There is a small mill whose last production was in 1908. Property considered a promising prospect.

DANUBE COPPER MINING CO., LTD.

HUNGARY

Went into liquidation, Dec., 1912. Described Vol. X.

DANUBE MINING CONCESSION, LTD.

AUSTRIA & SERBIA

Secretary and office: J. R. Jones, 3 London Wall Bldgs., London, E. C., England. W. J. Barnett, Capt. S. Saunderson, J. P., Count C. von Wartensleben, F. von Pilis, H. Hefti, directors; W. J. Barnett, 3 London Wall

Bldgs., E. C., England, cons. engr. Company registered in England, July 20, 1910. Capitalization £240,000, shares £1 par; 93,607 shares issued; 90,000 vendors shares and 850 additional, fully paid; 2,750 with 10s. paid. Offered 99,143 shares public subscription Feb., 1911, payable 2½s. immediately, 2½ allotment, 5s., 1 month later and balance in 5s. installments on call at not less than 2 months interval.

Property includes (1) copper mines in Austrian Tyrol, in Zell am See district, and Mittersill, in Pintschgau, Austria, (2) concession for 500,000 areas copper-bearing ground and other metalliferous deposits in the Lutter district, Servia, on right bank of the Danube river, between Brnyzce, Zagubiza and Kladova, and (3) graphite deposits and works at Artstaeden on Danube and near Bruck on Muhr. Company is a parent corporation to prove mining property and float subsidiary companies.

The Servian rights are regarded as very valuable, being adjacent to the very profitable Bor copper mines and the Majdan copper mines and contain gold, silver, lead, zinc, iron and coal mines, besides copper. Mr. Arthur Hall and Dr. F. Radovanovitch, of the University of Belgrad, and Prof. Dr. Tannhauser, of Mining University of Berlin, have examined the property. The company has had the advice of the most prominent and experienced copper men of Europe.

DARWIN PROSPECTING SYNDICATE.

TASMANIA

James Souter, mgr., Darwin, Mt. Lyell district, Tasmania. Property, several copper claims near the Lyell Comstock mine, on which several small veins of chalcopyrite cut through argillaceous schist. The schist adjacent to the veins is impregnated with copper pyrite and amenable to concentration. Development by 3 tunnels on which work has been done for the past 5 years. No. 3 tunnel shows 12' and No. 4 tunnel 10' of commercial ore. Property is a small one, only 2 men being constantly employed.

DAY DREAM AND BRETONARTE

COPPER MG. CO.

NORTHERN TERRITORY

Leighs Creek, No. Territory, Aus. Idle and apparently moribund.

DEFENSO y TODOS SANTOS; SOCIEDAD MINERA.

CHILE

Mine office: Taltal, Antofagasta, Chile. The mine was a small producer of slightly auriferous copper ore at last accounts. Presumably idle.

DE KAAP COPPER MINES, LTD.

TRANSVAAL

Closed down. Mine at Barberton, Middleburg, Transvaal. Described Vol. VIII.

DEMIDOFF COPPER MINES & WORKS.

RUSSIA

Described under Nijni-Tagilsk.

DERWENT PROSPECTING ASSOCIATION.

TASMANIA

Idle. Office: Hobart, Tasmania. Mine office: Leina, Devon Co., Tasmania. E. H. Butler, chairman. Lands, 24 miles from Leina, in the Cradle mountains, include the Derwent, Cradle Mountain and Lake Windermere mines, showing large quantities of low-grade ore, occurring as stockworks in Archaean schist. Property is estimated by Dr. Fritz Noetling, to show 2,000,000 tons of ore on surface, which possibly may be the case. Company also had property at Heazelwood, on the Whyte river, which was forfeited as valueless.

DESCUBRIDORA MINE.

CHILE

Owned by Sociedad Industrial de Atacama.

DEVON UNITED MINES (1906), LTD.

ENGLAND

Office: 7 Arundel St. Strand, London, W. C., England. Mine office: Peter Tavy, Devonshire, England. G. Bargate, chairman; J. V. E. Taylor, S. H. Badock, W. Stevens and Col. H. Paget, directors; R. L. McLatchie,

sec. Organized Dec. 10, 1906, under laws of Great Britain, as successor of Devon United Mines Syndicate, Ltd., capitalization £25,000, shares £1 par; fully issued and fully paid, including £9,000 shares, together with £5,000 in 6 first debenture bonds paid for property. There are also £6,800 (part of £10,000) 6% second debentures. Paid 1 dividend of 6d. per share in 1907. Accounts for last report, submitted April 21, 1911, show sales of ore, etc., £6,262, with net profit of £481; credit balance, £535; cash, £166; stocks, £3,423; plant and mines, £27,534.

Property includes leases of tin, copper and arsenical pyrite mines, including the South and Central mines covering 100 acres in Cornwall on the Tavy river. Central mine was formerly regarded as most promising copper prospect opened in Cornwall in many years.

DEVONSHIRE SYNDICATE.

Major G. C. W. Crawford, mgr. Property in the Cajabamba district and the Huinac mines in the Huaraz district, the former containing several large copper veins now being developed. In the Huaraz district no further development will be prosecuted until a railroad can be built.

DIAZ; G. RUIZ.

PERU

Office and works: Cerro de Pasco, Junín, Peru. Mine, known as the Mina Grande, near Cerro de Pasco, carrying copper ore without gold or silver values, employed 30 men, 1908. There also are 2 extremely small and antiquated furnaces, El Rayo, of 8 metric tons daily capacity, idle, and San Miguel, of 6 to 8 metric tons daily capacity, employing 10 men, at last accounts.

DIVES; SOC. FRANÇAISE D'ELEC.-METALL. DE.

FRANCE

Office: 11 bis, Rue Roquëpine, Paris, France. Works office: Dives, Caivados, France. Plant is an electrolytic refinery, treating Chile bars, having four 170-kw. generators, with 216 tanks, electrodes being arranged on the Elmore plan, works having a capacity of 10 to 12 tons of copper daily.

DJEBEL CHOUICHIA MINE.

TUNIS

Mine office: Souk El Arba, Tunis. Property carries mainly malachite and azurite, with occasional chalcopyrite and tetrahedrite, in limestone, near a contact with hematite. The antimony and arsenic in the ore produce considerable speiss. The smelter has two 30-ton circular water-jacket blast furnaces, using coke, costing £65 per ton delivered, to the extent of 13.5% of the copper ore charge. Silicious flux is used generally, but occasionally the mixture of oxidized ores and pyrites is smelted without flux. Product is speiss and copper matte of 35 to 50% copper tenor, sold mainly in Italy, for the manufacture of copper sulphate.

DJEBEL OUENZA MINE.

ALGERIA

Owned by Société Concessionnaire des Mines d'Ouenza.

D'JELELE COPPER SYNDICATE.

TRANSVAAL

Mine near Pietersburg. Zoutpansberg, Transvaal. Organized July, 1907, but apparently not incorporated, capitalization £4,000, shares £10 par. Lands, 96 claims, near the D'Jelele river, in the northeastern part of the Zoutpansberg district, having a 44' shaft showing ore assaying up to 15% copper. Idle.

DOBBYN MINE.

QUEENSLAND

Owned by Queensland Copper Freeholds Co., Ltd. Mine near Cloncurry, Beaconsfield Co., Queensland, Australia.

DOGAMARU MINE.

JAPAN

Mine near the village of Ago, Ochi district, Iwami, Japan. Tojuro Hori, owner; J. Stajaki, mgr. Mine opened 1845, reopened 1873, carries chalcopyrite, argentiferous galena and sphalerite ore with iron pyrites, in a quartz gangue. Principal vein, of 10 to 25' width, traverses granite-porphry and

is thrown by frequent faults. Equipment includes steam and electric installations aggregating 744 h. p., and a small smelter. Production was 445,105 lbs. fine copper and 1,141,482 grams silver in 1906; 423,371 lbs. copper and 258,393 momme silver in 1907, and 125,695 lbs. copper and 79,200 momme silver in 1908. Later production refused.

DOLCOATH MINE, LTD.

ENGLAND

Secretary and office: F. W. Thomas, Dolcoath Mine, Camborne, Cornwall. F. Harvey, J. P., C. C., chairman; O. Wethered, vice-chairman; J. M. Holman, C. B. Pearce, H. C. Godfray and F. A. Robinson, directors; R. A. Thomas, mgr. Company registered July 15, 1895, capital £350,000, shares £1 par; all issued and fully paid.

Property consists of the Dolcoath mine, probably the most famous copper and tin mine in England. Present company holds a 60-year lease from 1895, paying a royalty on the output. In 1898 company increased its holdings by the acquisition of the Dolcoath West properties, comprising 3 sets. The mine was worked extensively in the 18th century for copper and in 1799, the Dolcoath Mining Co. commenced working, producing copper, tin, arsenic, silver and cobalt, until 1867, to the value of £3,234,693.

Present company has a new 3,000' circular shaft with extensive workings from which a large output of low-grade tin ore is being extracted, a small amount of copper being obtained as a byproduct. There are many hundred thousand tons of complex ore not being worked owing to lack of mill capacity, but believed will yield a fair profit with the Elmore process. Mill consists of 16 pneumatic stamps, driven by electric power, the product, when complex, being treated in an Elmore oil concentration plant.

Company paid 12½% dividend in 1912 and 7½%, Feb., 1913.

DOLGELLY COPPER MINES, LTD.

WALES

Office: Capel House, New Broad St., London, E. C., England. Mine office: Dolgelly, Merionethshire, Wales. Percy Ellis, chairman; H. R. Schmettau, H. S. Sugden, directors; George Kerr, sec.; J. Bevan, mine mgr. Organized March 7, 1907, under laws of Great Britain, capitalization £67,882; 42,882 shares £1 each, and 50,000 preferred at 10s. each; all the ordinary and 38,499 preferred issued and fully paid.

Property consists of several mining claims, including the Dolgelly mine, near Dolgelly, North Wales. The mine was operated several years before the present company acquired it, but the operations were unprofitable for the recovery was only 14.5% of the metal contents of the 50,000 tons treated. The mine was examined and reported on by Mr. Arthur Thomas, mgr. of the Dolcoath mine, and Mr. W. R. Gilman Brown.

The vein averages 20' wide and has yielded 100,000 tons of ore for each foot in depth. The ore is a hard quartz, containing extremely fine particles of copper sulphides, with gold and silver values. The average value of the ore milled up to 1912 was about \$4 per ton, but the ore in the lower levels of the mine is somewhat richer, samples at 5' intervals on the 280' level showing \$6.42, the vein averaging 21' wide.

Mine has a shaft 400' deep with workings on the vein at 180', 240', 280' and 380' levels, the orebody being continuous downward with unchanged width.

Equipment includes hoist, compressor and drills, with a 20-stamp concentration mill handling 100 tons per day, and a complete Elmore vacuum concentration plant which has given excellent results and raised the extraction from 50% in recent years to nearly 70% in 1912, the gross value of the ore being 16s. per ton and the net yield 11s. with copper at 12 cts. Production stopped in 1910, resumed Oct. 28, 1912, estimated at 37,500 tons for 1913. Monthly reports issued by company show 6,903 tons for the 5 months

ending March 31, 1913, with a recovery of 551 tons concentrate at a total cost for mining, development and milling, of £3,165. Development costs, \$6.56 per ft.

DORA COPPER MINES, LTD.

TRANSVAAL

Idle. Mine near Pretoria, Transvaal, South Africa. W. Vaughan-Williams, chairman. Organized May 10, 1905, under laws of Great Britain, capitalization £150,000, shares £1 par; issued £100,010. Property is mining rights to the northwestern half of the Farm Kamelpoort No. 278, area 4,027 morgen, near Pretoria.

DOROTEA; GEW. d. BLEI u. KUPFERERZBERGWERKE. GERMANY

Mine office: Jannowitz, Schlesien, Germany. Rev. John Kaufmann, sole owner, Kupferberg, Silesia, Germany. Organized 1886, capitalization M200,000, shares issued to owner, 200. Mine discovered 1857, opened 1902 and closed 1910 on account of illness of owner. Developed mainly by tunnels with 1 shaft.

DUCHESS MINE.

QUEENSLAND

Owned by Hampden-Cloncurry Copper Mines, Ltd.

DULUTH-HUSA COPPER MINES.

SWEDEN

Office: 218 Superior St., Duluth, Minn. Mine: Bjornange, Jemtland, Sweden. Andrew Bjorkman, pres.; Aaron Carlson, vice-pres.; John Boden, sec.; Albert Johnson, treas.; preceding officers, John F. Freeman, S. P. Carlson, A. W. Harper, A. J. Borgstrom, J. H. Nelson, Olof Berglund, Elmer G. Johnson and A. E. Rydlund, directors; Emil Nyberg, gen. mgr.; A. E. Lind, mine supt. and mg. engr. Organized Nov. 12, 1909, under laws of Arizona, capitalization \$1,000,000, shares \$5 par; issued, 116,229, non-assessable. Property is held through the Aktiebolaget Husa Froa Grufvor, a Swedish corporation. Annual meeting, first Tuesday in October.

Lands, 6,000 acres, with about 3,000 acres timbered, said to include Froa, Husa and 17 other old mines, lying on the slope of Mount Areskutan. Property, 3 miles from a railroad, shows granite, quartzite and schist, of various ages, with rather flat banding, pitching into the mountain, carrying seams, streaks and pockets of ore, more or less well defined, with outcrops traceable for miles, principal ore being chalcopyrite, with some bornite. These copper deposits were discovered 1740, and mining begun 1745, but mines were closed, 1881, because of primitive methods and low price of copper.

Property is equipped with electric power, has 2 hoists, a 20x30' machine shop, blacksmith shop, a 40x60' carpenter shop and a saw mill.

Company now has a 100-ton concentrator, equipped with 15 Deister tables and is working the mine as well as developing new ore reserves.

DURAZNO SMELTER.

CHILE

Owned by Francisco Greve G., at Combarbola, Chile.

DZHILTAV WORKS.

SIBERIA

Office: Karkuralinski, Semipalatinsk, Siberia. Owned by Warter & Co. Property is a reduction plant including smelter and electrolytic refinery.

EAST GRIQUALAND COPPER & NICKEL MNG. CAPE PROVINCE CO., LTD.

Office: P. O. Box 629, Johannesburg, Transvaal. Mine office: Mt. Ayliff, Griqualand East, Cape Province, S. Africa. Geo. Peel, chairman; Griff Evans, mgr.; preceding officers and Dr. Davie Thompson, directors. Organized Dec., 1908, under laws of Transvaal, capitalization £12,500, increased 1911, to £17,500; shares £1 par, of which £7,000 went to vendors and £1,500 remain unissued, for reserve, giving £4,000 for working capital.

Lands, 44 morgen, on the eastern side of the Insizwa range, near Mt.

Ayliff, held on a 99-year lease, which carries a royalty of 2s. 6d. per long ton on ore, payable to the government, plus a royalty of 1% on the gross amount realized from ore. Mine has a crosscut tunnel, cutting the vein 250' from portal, giving a back of 150'. Some ore has been found assaying up to 2.25 oz. platinum per long ton, with small silver and cobalt values.

EAST GWANDA MINES, LTD.

RHODESIA

On Jan. 11, 1912, Sir W. B. Peat, of 11 Ironmonger Lane, London, E. C., was appointed receiver and manager and on Nov. 19, 1912, an order was made that the company be wound up by the court. Company was at one time largest copper producer in Rhodesia. Fully described Vol. X.

EASTERN DEV. CORPORATION, LTD.

INDIA & CEYLON

Secretary and offices: Wallace Braley, 25 Victoria St., London, S. W., England. India offices: Ismail Bldg., Hornby Road, Bombay. Organized Dec., 1912, under laws of Great Britain, capitalization £250,000, shares £1 par. In Jan., 1913, 166,667 shares were offered at par in 5s. installments at 2 months intervals.

Company was promoted by the Eastern Syndicate, Ltd., the vendors. Mining interests acquired consisted of licenses, rights, leases and options on gold, diamond and other lands in the various states of India, including an exclusive right to prospect for copper in the state of Jhalawar, India, with the right to take up a 30-years' mining lease. The mining properties reported on by P. Bosworth Smith and L. H. Neave. Secretary writes in July that the properties are not in a sufficient forward condition for report.

ECHAVARRÍA; GUILLERMO.

CHILE

Office, mine and works: Illapel, Coquimbo, Chile. Property is a very small smelter, known as the Fundación de Quilomenco, at the Hacienda Chuchiñe, near Illapel. Production formerly was about 225,000 lbs. fine copper yearly, but was only 11,743 lbs. in 1907. Idle several years.

ECLIPSE MINE.

NEW SOUTH WALES

Mine in Albert mining district, White Cliffs division, parish Wertago, Yungnulgra Co., N. S. W., Australia. Lands, 80 acres, 60 miles from Wilcannia. Mine, discovered 1892, has a 4' vein in mica schist and slate, developed by a 140' shaft, showing, on the 108' level, a vein of 30" maximum width, carrying sulphide ore of good grade. Production, 1905-07, was 200 long tons of ore of 25 to 30% copper tenor. Property idle several years but reopened, 1912. Newly opened stope shows 8' vein with 4' ore. East shaft 71' deep, at east end of outcrop, cuts hanging wall.

ECLIPSE MINE.

QUEENSLAND

Owned by the Chillagoe Co. at Einasleigh, Queensland, Australia.

ECONOMOFF MINE.

BULGARIA

Described under Kara Bair.

EDISON MINE.

NEW CALEDONIA

Office: Noumea, N. C. Property has produced in a small way for years, ore shipped assaying 17.34% copper and 1.6 oz. gold per ton.

EDMUNDIAN COPPER MINE.

PORTUGUESE EAST AFRICA

Property in the Manica district is held by the South African Copper Trust, Ltd.

EDMUNDIAN COPPER MINING CO. PORTUGUESE EAST AFRICA

In liquidation. All property sold, 1911, to the South African Copper Trust, Ltd., 277 Salisbury House, London Wall, London, E. C. England. Described Vol. X.

EINASLEIGH FREEHOLD COPPER MINES, LTD.

QUEENSLAND

Succeeded by New Einasleigh Copper Mines, Ltd., also liquidated and property now worked by the Chillagoe, Ltd., at Einasleigh, Queensland, Australia.

EINASLEIGH MINE.**QUEENSLAND**

Purchased, 1911, by Chillagoe Co.

EISERNER UNION; GEWERKSCHAFT.**GERMANY**

Office: Siegen, Germany. Mine office: Eisern, Westfalen, Germany. Robt. Hilgenberg, R. Honigsheim, Paul Petzold, Dr. Loeb, Albert March and J. W. Piepmeyer, executive committee; Emil Frisch, gen. mgr.; Herr Kolb, supt. Capitalization 1,000 shares. Property, 3 mines, the Prinz Wilhelm, Eiserner Union and Thalsbach, the Alter Flussberg mine having been sold to the Gewerkschaft Werder for 150,000 marks. Mines having 3 shafts and 6 adit levels, produce iron ore and copper sulphides. Company plans installation of an aerial tram, and an ore washing and roasting plant. At last accounts, 1912, employed about 100 men, with annual production of 120,000 metric tons of iron ore.

EISFELDER KUPFERGEWERKSCHAFT.**GERMANY**

Mine office: Glücksbrunn, Saxe-Meiningen, Germany. E. J. Enners, J. W. Piepmeyer, Dr. O. Hecker, Jos. Schmidt-Jerome, Dr. Emil Müller and F. Wipperm, executive committee; Alex. Müller and Herr Wenzel, gen. mgrs., at last accounts. Capitalization 700,000 marks, shares 100 marks par.

Lands include the Marie Louise and Wilhelm August mines, having 2 shafts, and property has been a producer since 1904. A concentrator, built 1908, also treats custom ores. It was decided, 1910, to build a potash plant at the Wasungen mine.

ELEANORA COPPER MINE.**QUEENSLAND**

Property situated on the Langmorn Freehold, held under lease on a royalty basis. Syndicate started sinking, Jan., 1912, and 10 tons of ore sent to Port Kembla for treatment assayed 8% copper. A 115' shaft shows an orebody reported to average 3' in width and to carry high copper values. Production for 1912 was 135 tons of ore containing 19 tons 4 cwt. copper, of a value of £1,437, which was sold to the Mt. Morgan Co. In 1913, 52 tons of ore was shipped averaging from 9.47 to 12% copper.

ELECTROLYTIC REF. & SM. CO. OF AUS., LTD. NEW SO. WALES

Office: 118 Pitt St., Sydney, N. S. W., Australia. Works office: Port Kembla, Camden Co., N. S. W. Australia. Employs about 300 men. Richard Gardiner Casey, chairman; Kelso King, Francis H. Snow and Capt. G. A. Richard, directors; J. S. Spark, sec.; Benj. Magnus, gen. mgr. Organized Feb. 3, 1907, capitalization £150,000, shares £5 par, nonassessable; fully issued. Debentures, £150,000 authorized, at 5%; issued, £140,000. Annual meeting, Dec. 20 of each year. Company is the only refiner of copper in Australia and treats 80 to 90 tons of copper per day.

Lands, 54 acres, with deep water in front and direct rail connection at the rear. Coal is produced in the immediate vicinity, with annual consumption estimated by management, 1911, at 40,000 tons, averaging 9s. 6d. per ton in cost, and 4,000 long tons of coke, costing 15s. The plant, costing £197,000, stands at the foot of a gentle slope, buildings practically being on a level, with sampler and storage houses above. There is a tank for water storage. The sampling mill, in line with the storage house, is in two sections.

The smelter building is 105x216', having one 150-ton rectangular water-jacket blast furnace. There are four 18x35' reverberatory furnaces, with 2 openings on each side, formerly rated at 60 tons daily capacity each, but now rated by management at 30 tons only. The main flue is of steel pipe, 48" in diameter, and brick-lined, with dust chambers, and a flue from the converters, continued into a brick flue running up the hill to the stack. The converter department also has an 18x35' reverberatory furnace. The

charging floor supported by steel I-beams carries tracks for electric cars, with openings for the hoppers that supply the ore and fuel to the furnaces.

The converter department has 2 stands, with 80x120" shells, of barrel type, rotated electrically. Matte is run directly into converters and hot slag is poured back into the reverberatory. Sheet steel removable hoods connect with a dust flue of steel pipe, leading to the main flue. Blister copper from the converters is sent to the refining department, where cast into anodes. The lining department has a jaw crusher, Chilean mill and mixing pan, using barren quartz with a binder of clay, linings being tamped into shells by a rock drill fitted with a rammer.

Blister copper from the converters is sent to a building 50x60', having two 90-ton refining furnaces, with a casting machine for each, casting anodes that average 98.7% copper, 40 oz. silver and 15 oz. gold per ton. There is also a 150-ton wire bar furnace with mechanical charging.

The electrolytic refinery is 100x504' in size, treating blister copper of the Mount Morgan Co. and Mount Lyell mines, and refining about 85% of the Australian copper output. The works use the multiple system, with double tanks and an adaptation of the 3-wire system, a small triangle of copper being used as a center conductor. The plant began with 360 and now has 600 tanks, each 10' 2" long, 3' 6" deep and 3' 7" wide, lead-lined, and placed in sets of three, communicating by pipes. Each tank holds 5 tons of anodes. The electrolytic refinery has a silver and gold refinery, which uses a process whereby the slimes from the electrolytic plant are calcined before leaching. The enlargement of the refinery, in construction, 1913, was suspended as a result of the great disaster at Mt. Lyell and the consequent reduction of blister copper sent to these works for refining.

The 100x100' power house has a boiler plant with 6 Babcock & Willcox boilers, mechanical stokers, Green fuel economizer, superheater, and induced draft. The engine plant includes two 880-h. p. Bellis & Morcom triple-expansion engines, direct-connected to two 550-kw. Westinghouse generators, supplying a 125-volt current for the tank house. There are also two 150-h. p. Bellis & Morcom double-expansion engines, direct-connected to Westinghouse generators supplying current for power and light. A Parsons turbo-blower has a capacity to furnish 25,000 to 35,000 cu. ft. of free air per minute, at a pressure of 12 to 15 lbs. per inch.

The shop building, 50x120' in size, includes a machine shop, smithy and carpenter shop, all fully equipped with modern tools. In connection with the works is a fine laboratory and assay office.

A jetty, built by the government, with 40' of water alongside, is 300' in length, and is to be 500' when completed. There are 4 miles of private railway tracks, with 2 locomotives.

This plant began work Feb. 1, 1908, and has demonstrated its efficiency by reaching a point where it now refines about 85% of the entire Australian output of copper. The electrolytic copper produced is branded E. S. A. Production was 5,851 long tons of electrolytic copper, mainly from Mount Morgan matte, valued at £351,000, and doré bullion valued at £123,952, mainly from Mount Morgan matte, in 1909. Production, in 1910, was 112,485 oz. gold, 65,821 oz. silver, and 9,952 tons copper, the last named valued at £583,027. Production, 1912, was estimated at about 22,000 long tons copper, 200,000 oz. silver and 800,000 oz. gold. This plant fills a want long and seriously felt in Australia, and the design and management are highly creditable to Mr. Magnus.

Company was receiving premiums in France and Germany for its copper in 1911, which is delivered under guarantee of being 999 fine, slightly higher than American standard guarantees. Silver is shipped to India and

gold sold to Australian banks. A federal bonus, or an export duty on copper, was proposed, 1912, to encourage this industry.

ELGÜE; AGUSTO.**CHILE**

Mine: Peña Blanca, La Ligua, Aconcagua, Chile. Property is the San Pablo mine, 15 kilometers from Peña Blanca, showing a vein of about 1 meter average width, which has produced small quantities of 9% copper ore. Presumably idle.

ELIZA; KUPFERERZBERGWERK.**GERMANY**

Mine office: Mallau, Elsass, Germany. Property, said to be owned in London, is merely a prospect, which has been under leisurely development for some years.

ELSIE I; GEWERKSCHAFT.**GERMANY**

Idle. Mine near Dortmund, Westfalen, Germany. Wilhelm Samm-Wattermann, gen. mgr. Property carries lead and copper ores.

EMERALD MINE.**NEW SOUTH WALES**

At Trough gully, 15 miles from Tamworth. Owned by Trough Gully Copper Co., Ltd., New South Wales, Australia.

ENGLISH & AUSTRALIAN COPPER CO., LTD.**SO. AUSTRALIA**

Office: 17 Gracechurch St., London, E. C., England. Works office: Port Adelaide, Adelaide Co., South Australia and Waratah, Newcastle, N. S. W., Australia. W. Russell, chairman; W. S. Cuff, deputy chairman; preceding officers, T. Ganter and J. B. Caldecott, directors; G. E. Cecil Clarke, sec.; F. S. Chany, gen. mgr.; H. Schröder, smelting mgr., Waratah smelter; F. E. Wigmore, agt. Organized 1851, and reorganized March 15, 1864, under laws of Great Britain, capitalization reduced to £105,000, shares 30s. par; issued £102,988 10s. Debentures £30,250, at 6%, due Jan., 1917. Dividends have been as follows: 6d. in 1901; 1s. each in 1902, 1903, 1904, 1905, 1906, 1907 and 1908; 1909, 1910, nil, owing to litigation; 1911, 1s., paid May, 1912. Net profits were £1,458 in 1910 and £3,853 in 1911. Company controls through ownership of 3,904 shares, the new Clara St. Dora Mining Co., N. L.

Property includes custom smelting works at Waratah and Port Adelaide, employing about 100 men, this company having built the first custom smelter in the commonwealth of Australia.

ENTERPRISE COPPER MINING CO., N. L. **SOUTH AUSTRALIA**

Idle. Last address: Barossa, Adelaide Co., South Australia. Company had a £150 subsidy from the South Australian government; 1908. Lands, freehold, 2 miles from Williamstown, have a 4' quartz vein carrying a 6 to 8" footwall pay streak of melaconite, malachite and chalcopryite, all with good silver values. Mine has a 220' main shaft, with steam power and a hoist, and many years ago shipped a little ore of 28 to 40% copper tenor.

ERA MINING PROPERTIES DEV. SYND., LTD.**QUEENSLAND**

Secretary and offices: W. T. Gittens, 6 Broad St. Place, London, E. C., England. Col. F. B. Buist, Hon. M. Erskine, J. G. Malcolmson and R. G. Scott, directors. Organized June, 1910, under laws of England. Capitalization £20,000, in 19,750 ordinary shares at £1 each and 5,000 deferred at 1s. each; 4,787 ordinary shares issued and entitled to a preferential dividend of 7%; the deferred are entitled to one-half the surplus profits.

Property consists of the Jingalalla properties in Victoria, Australia and the property of the Mount Godkin Consolidated Copper Mines, N. L., 35 miles from Cloncurry, Queensland. The Mount Godkin mine is on Cameron creek above Corella river. According to Government reports the claims show metamorphosed sandstone and slate with a copper belt traceable by trenches for 2 miles, having an average width of 200'. A 48' shaft exposes a lens of ore 40' across from which a 20-ton shipment gave returns

of 20% copper and \$10 in gold. Development consists of many shallow shafts but is insufficient to determine future of property. An extension of the railway contemplated by the government will enable this property to be worked.

ESCURIAL COPPER MINES, LTD.

SPAIN

Idle. Office: 4 Union Court, London, E. C., England. Operating office: Pelayo 2, Barcelona, Spain. Mine office: Calmenarijos, Madrid, Spain. Albert F. Colbert, chairman, and W. Stewart Lane, directors; Joaquin Lorena, mine mgr.; Henry N. Gardiner, sec. Organized Oct. 17, 1901, under laws of Great Britain, capitalization £125,000, shares £1 par; issued, £109,177. Lands, 342 acres, held under perpetual lease from the Spanish Government, including the Gloria, Ramón, Jaime and Nuestra Señora del Pilar mines. Work is confined to the latter, which shows 8 orebodies and was worked by the ancients, either Romans or those who preceded them, to a depth of 135', by 3 shafts, with several drifts. Small shipments of selected ore from the Pilar mine have given returns of 7.73 to 20.36% copper. Property leased, on royalty, to a French syndicate in 1908.

ESMERALDA MINE.

NEW SOUTH WALES

Office: Rockley, Georgiana Co., N. S. W., Australia. Mine, in the Cow Flat district, has a 150' shaft, bottomed in a vein of 3' width, formerly said to be 10', with first level at 100', carrying ore of 8 to 10% copper tenor. Was developing on a small scale in 1910. Idle.

ESPERANZA COPPER & SULPHUR CO., LTD.

SPAIN

Office: 65 London Wall, London, E. C., England. Mine office: Zalamea la Real, Huelva, Spain. Sir Robert J. Price, M. P., chairman; T. D. Lawther, sec. and gen. mgr.; Stanlake Lee, Alex. McNab, G. Mure Ritchie, Rhys Williams, directors. Organized Feb. 14, 1906, under laws of Great Britain, as successor of Spanish Minerals Development Co., Ltd., capitalization £350,000, shares £1 par; fully issued, fully paid. Debentures outstanding, £65,270, at 5%, redeemable, not later than 1916, at £110, by annual drawings. Net earnings were £27,553 in 1908; £19,961 in 1909, £14,754 in 1910; £29,562 in 1911 and £32,730 in 1912. Dividends were 5% in 1908; 3% in 1909; 4% in 1910; 3% in 1911; 3% in 1912, and 2% June, 1913.

Lands, the Esperanza group, 1,833 acres, including 833 acres of mining rights, 5 miles from the port of Huelva. Holdings include the Esperanza, Nueva Esperanza, Angostura, Forzosa and Santo Tomás mines. Some of these properties were worked in very ancient times, mainly on a very small scale, showing characteristic narrow Roman shafts, with foot holes alternately, on either side, for ingress and egress of miners.

The Angostura mine is the largest of the group. Stripping was continued and levels No. 3 and No. 4 opened up in 1911-12, exposing 352,000 tons, or about 7 years' supply. The output was 48,494 tons in 1911 and 37,591 tons in 1912.

The Esperanza and Forzosa mines were opened up in 1912 and 1913 on the 6th and 7th levels, increasing the ore reserves to a total of 529,000 tons. The output is about 59,000 tons a year.

Neuva Esperanza yielded 1,029 tons in 1912. Development on level No. 2 showed the lode to pinch out and this lens is practically exhausted. Development by a 119' shaft and crosscut from the Santo Tomas failing to show ore, work was stopped. Total ore reserves at end of 1912 estimated at 881,000 tons.

There is a small leaching plant making 73 long tons of copper, 1907; 73 in 1908; 35 in 1909; 77 in 1910; 124 in 1911, and 137 tons in 1912.

Company has a private narrow-gauge electric line connecting with the

Buitron railroad. The power plant consists of 3 Premier gas engine units, each with a suitable gas producer plant, with electric generators, the plant giving economical and satisfactory service.

Production, begun July, 1906, has been as follows: 20,421 long tons of ore in 1906; 54,276 tons in 1907; 87,894 tons in 1908; 103,140 tons in 1909; 112,143 tons in 1910; 108,650 in 1911; 975,888 tons in 1912. The great reduction in the latter year was due to strikes in England. Company produces no metallic copper directly from its ore, but the copper contents of the pyrite shipped amounts to about 3,000,000 lbs. yearly. Production of refined copper is estimated at 1,000,000 lbs. fine copper in 1907; 1,500,000 lbs. in 1908; 1,750,000 lbs. in 1909, and 2,000,000 lbs. in 1910. Property considered excellent, management good and dividends assured for some years to come.

ESPERANZA FRANCESCA.

BOLIVIA

Area, 30 hectares, in the Cerros Escampa, Canton San Cristobal, Bolivia.

ESPINOZA; JOSÉ RAMÓN.

CHILE

Idle. Mine office: Las Palmas, Petorca, Aconcagua, Chile. Works office: Pedegua, Chile. Properties, about 75 miles northeast of Valparaiso and 35 miles from the sea coast, include Las Reices mine, 60 meters deep, which in 1903 produced 537 metric tons of ore of 13% copper tenor, and La Maria Luisa mine, 150 meters deep, which, 1903, produced 300 metric tons of 5% copper ore. Cement copper, made from mine waters, is produced in small quantities. Mines, slightly developed, show large quantities of low-grade ore, carrying considerable gold and silver values, occasionally ranging up to 700 grams silver and 25 grams gold per ton. No recent returns secured.

ESTRELLA; SOCIÉTÉ ANONYME LA.

SPAIN

Office: 161 Boulevard Haussmann, Paris, France. Mine office: Los Martires, Granada, Spain. Capitalization 200,000 francs. Lizardo González, vice-pres.; Louis Vardón, agt.; Huberto Meersmans, gen. mgr.; Antonio Melian, supt., at last accounts.

Lands, 1,222 acres, in 3 groups, formerly under option to La Estrella Copper Mines, Ltd. Lands include La Jerezana, El Ensueño and other copper mines, at Los Martires, which are of some promise, but development is hampered by lack of transportation facilities and very high freight rates on the Ferrocarriles del Sur de España. There also are argentiferous copper groups at Trevezal and Alpujara, Granada. The English company planned building a small concentrator and a 10-stamp mill, but apparently failed to do so. Presumably idle.

ETHERIDGE GOLD MINES.

QUEENSLAND

Secretary and head offices: C. L. Hewitt, 39 Queen St., Melbourne, Australia; London secretary and offices: E. Habben, Palmerston House, London, E. C., England. J. S. Reid, chairman; H. F. C. Keats, D. W. H. Patterson, V. J. Saddler, Col. F. G. Hughes, W. D. Reid and F. J. Gordon, directors. A. J. MacGeorge, mgr. Organized Dec., 1910, capitalization £60,000, shares 10s. par, fully paid. Owns 4 gold mining properties, Big Reef, Havelock, Nil Desperandum and Queenslander, 144 acres, on the Etheridge Goldfield, Queensland. The Havelock has gold-copper ore, the Queenslander gold-silver-lead-zinc ore. The concentrating and cyaniding mill yielded 9,402 tons from May, 1912, to Nov., 1912, carrying 5,377 oz. gold, 4,281 oz. silver and 27 tons copper. The combined ore reserves were estimated in 1912 at 50,350 tons. Copper production, 1913, 2 to 7 tons per month. Company not regarded favorably as veins are small, development inadequate to provide a profitable output and working capital too small.

EXPLORATION CO., LTD.**ENGLAND**

Office: 11 Cornhill, London, E. C., England. R. T. Bayliss, pres.; H. M. Shaw, managing director; preceding officers, J. R. Maquire, H. Mosenthal, J. E. Dudley Ryder, G. D. Smith, O. E. Warburg, directors. H. F. Wreford, sec. Organized March 21, 1904, under laws of Great Britain, capitalization £750,000, shares £1 par, fully paid, nonassessable; all issued. Dividends since 1905 have been 5%, or 1s. annually, except in 1907, and 1s. 6d. in 1912. Stock listed on London Stock Exchange. Annual meeting, February or March. Company succeeded and acquired all the assets, save those acquired by the Exploration Assets, Ltd., of a company of the same name organized in 1896.

Company carries on a general financial business and holds interests in real estate and buildings and also in gold mines in South Africa, the Tomboy Gold Mines Co., Ltd., El Oro Mining & Railway Co., Suchi Timber Co., Buenna Tierra Mining Co. and in the Exploration Co. of England and Mexico, sundry investments in the balance sheet being given as \$2,410,000. Owing to political trouble in Mexico, the Chihuahua smelter which deals with ore from the Buena Tierra Co., was only worked intermittently in 1912, consequently the mine production was curtailed, though a first dividend of 24 cts. per share was paid.

Metallurgical difficulties upset predictions concerning the profits from the Santa Rosa mine. Both the El Oro and Tomboy mines showed marked improvement during 1912. Company also owns Freehold property in Cornwall, England, worth \$720,000. Gross profits for the year 1912 totaled \$386,880, and general expenses, directors' fees and sundry investigations were \$114,240, leaving a balance of \$272,640. A dividend of 7½%, amounting to \$180,000, was paid and, adding the amount carried forward from 1911, there remains a balance of \$92,640.

FALCON MINES, LTD.**RHODESIA**

Secretary and offices: Gold Fields Rhodesian Development Co., 8 Old Jewry, London, E. C., England. Major F. Johnson, chairman; Hon. A. G. Brand, A. Suter, T. M. Thackthwaite, B. Vieira, R. G. Fricker and W. F. Andrews, directors; T. Kamp, M. I. M. E., metallurgist; A. Logan, mine mgr.; Gold Fields Rhodesian Development Co., cons. engrs. Company organized Feb. 26, 1910, capitalization £600,000, shares £1 par; 400,000 issued and fully paid. Capital originally £400,000, increased Aug., 1912, to provide for bond redemption. Bonds £300,000 authorized, 6%, £250,000 outstanding. Accounts June 30, 1912, showed development account, £56,964; cash, £13,512; short loans, £36,703.

Property acquired from the Falcon (Rhodesia) Development Co., Ltd., by Rhodesia Consolidated, Ltd. In Jan., 1911, the Athens mine was acquired from the Athens Development Co. Mining property comprises 380 claims, 578 acres, farm lands near the Falcon mine, 500 acres adjoining the mine and 19 acres for machinery and water sites. Report for year ending Dec. 31, 1912, shows 960,000 tons developed with 629,877 tons carrying \$5.40 gold and 2.4% copper.

The orebodies are large. On the 3rd level they aggregate 880' long, 17' wide, and carry 2.45% copper and \$3.68 gold per ton; on the 4th level, 900' long, 36' wide; on the 5th level, 580' long, 47' wide; on the 6th level, developed for length of 350' and 50' wide. Average contents are better than 3% copper and \$5 gold per ton.

A thoroughly modern mill, now in course of erection, will treat 500 tons per day. It will include 36 Nissen stamps, whose product will be concentrated on tables to remove coarse material and the concentrates sintered, briquetted, treated in a blast furnace and blown in a converter

to produce auriferous blister copper. The tailings will be slimed in tube mills and treated by the Minerals Separation process.

According to a recent official statement Mr. A. H. Ackermann, cons. engr. of the chartered company, has expressed grave doubts as to the correctness of the assay plans and consequently of the £2,100,000 value of the ore reserves. This estimate is based on the figures already given with working costs of \$8.50 and copper at 12½ cts. The correctness of the mine samples and assays has been confirmed by J. G. McDonald, by independent work and doubt cast upon the accuracy of Ackermann and Pickering's sampling and assaying, so that this "mystery of the Falcon mine" is still unsolved.

FALUN MINES.

SWEDEN

Owned by Stora Kopparbergs Berslags Aktiebolag, at Falun, Sweden.
FAMATINA CO., LTD.

ARGENTINA

Office: 638 Salisbury House, London, E. C., England. F. H. Hamilton, chairman; R. F. Bury, D. L., J. P. William Parker, A. C. A., and D. H. Bayldon, M. I. M. E., directors. F. F. Fuller, sec.; Llewellyn Parker, resident mgr., Santa Florentina, Chilecito, Province of Rioja, Argentina. Hooper, Speak & Co., cons. engr.; W. G. Perkins, metallurgist; W. A. Carlyle, smelter supt. This company is a reconstruction of the Famatina Development Corporation, Ltd. Organized June, 1912, capitalization £800,000, shares 10s. par; 1,523,489 issued and fully paid, of which 1,126,165 are credited 7s. paid. Bonds authorized £200,000, 6%, of which £151,500 are issued.

Owns 850 acres, in 4 groups, in the Mexicana district of the Sierra Famatina range, province of Rioja, Argentine Republic, including the 6 principal mines of the district, the Upulungos group, Mellizas group, Compania group and San Pedro group. These lands lie at an elevation of 15,000' and are very difficult of access and transport.

Property shows an intricate network of auriferous and argentiferous fissure veins traversing metamorphic slate. The Upulungos and San Pedro are the principal veins, being about 1,000' apart. Lode on the first named was estimated to show 90,000 tons of ore averaging 2.5% copper, 6 oz. silver and 9 dwts. gold, in an ore shoot 3 to 9' thick and 1,200' long.

The San Pedro vein has an ore shoot 1½ to 2' thick and 600' long. The ore is a dense massive pyrite. Principal minor veins are the Andueza, Esperanza, Placilla and Verdeona. The old mines of this property have been worked, spasmodically, since 1840.

Development is mainly by the Anita tunnel, but there are other tunnels, including the Restaudora, Pacifica and Forastera. Ore is mined from 3 levels at once and sent without sorting over an aerial tram to the company's smelter. Company estimated, March, 1913, that 150,000 long tons of ore was developed.

Transportation between the mine and mill is by a Bleichert aerial tram, built by the Argentine government, at a reputed cost of about £175,000, connecting with the railroad of the state line. This aerial tram, of 21 miles length, one of the longest in existence, has its upper terminal 4,400 meters and its lower terminal 1,060 meters above sea level. There are 7 intermediate stations, at which steam power is available, for control and assisting up-bound traffic, but, under normal conditions the line works by gravity, except 1 section, on which there is only up-bound traffic of wood, coke, lime and smelter supplies. Capacity is 40 long tons per hour on down freight and 20 tons on up-freight, and cost of transport is estimated at about 5s. per metric ton, as against a former cost of 50s. The highest

tower is 40 meters, and longest span is 870 meters, with 500-kg. buckets. The line is said to be working satisfactorily.

A 500-h. p. hydro-electric installation, near the works, completed in 1909, has been a success.

The 250-ton smelter, known as the Santa Florentina works, is at Chilcito, about 1 mile from the Rio Amarillo, with perpetual water rights. The smelter has been remodeled and brought up to date. Equipment includes calciners, a briquetting plant and converters.

About 300 men are employed normally. Native labor is expensive, for its efficiency, costing 75 cts. to \$1 gold per day for common labor, \$1.25 for miners and \$1.75 for carpenters and smelter men.

Production, 1908, was 2,704 long tons of very low-grade matte, yielding 875,480 lbs. fine copper, 103,087 oz. silver and 6,622 oz. gold. Production in 1910 from 11,237 tons of ore smelted was 392,454 kilos copper, 3,976 oz. gold and 72,221 oz. silver; in 1911, from 33,097 tons of ore smelted, 893 tons of copper, 13,733 oz. gold and 187,090 oz. of silver; in 1912, from 11,401 tons of ore smelted, 345 tons of copper, 4,095 oz. gold and 68,389 oz. silver. The smelter was closed during the last 7 months of 1912 for remodeling, including erection of a reverberatory furnace.

The new smelter is expected to reduce the cost of reduction materially.

The company has inherited a troublesome problem and a tendency to financial as well as mining troubles. Fresh capital was put into the company in 1912, with the understanding that the property would be profitable as soon as smelting was resumed. The new manager, Mr. Parker, stated, May, 1913, that the assay value of the ore had been overestimated and that the ore extracted is lower grade than previously reported. The smelter is not yet complete nor running smoothly, and the finances of the company are in a bad way, the £20,000 guaranteed by the big stockholders having been spent and the directors seeking further funds. Mines regarded as good but company overcapitalized.

FAMATINA DEV. CORPORATION, LTD.

Succeeded, 1912, by the Famatina Company, Ltd.

ARGENTINA

FARELLÓN DE TONGOY; SOCIEDAD MINERA.

CHILE

Office: Valparaiso, Chile. Mine office: Tongoi, Chile. Works office: Ovalle, Chile. Organized Jan. 21, 1901, under laws of Chile, capitalization 150,000 pesos, shares 1,500 pesos par. No trace of operations secured.

FEDERAL REWARD CLAIM.

QUEENSLAND

Recently purchased by William Orr for £5,300, 160 acres, situated about 22 miles west of Cloncurry, Queensland, and within 10 miles of the Mt. Cuthbert railroad. Under management of A. M. Hogarth, late manager of Hampden Consols. Developed by many shallow shafts, the principal one, sunk 150', showed 8' vein with 1' of 50% glance ore. Operations stopped by water at this depth. Is a promising prospect.

FERNANDINI; EUOLOGIO E.

PERU

Office: 410, Callela Riva. Mine at 13,300' elevation, at Cerro de Pasco, Peru. Owns the Chiripa Bismuth mine, the Colquijirca, copper-lead-silver mine, and is heavily interested in mines worked by the Cerro de Pasco Mining Co. Has concentrating mill and stamps, Huntington mill, jigs, Wilfley tables and vanners. The smelting works contain a 70-ton and a 130-ton blast furnace; 2 roasting furnaces, using llama dung for fuel, and 2 reverberatory furnaces. Concentrates are briquetted, mill tailings ground in tube mill and cyanided. Power, hydro-electric, 1,500 h. p., from Rio Blanco. One of the best managed properties in Peru.

FERROBAMBA, LTD.

PERU

Secretary and office: F. F. Fuller, 638 Salisbury House, London, E. C.,

England. Operating office: Arequipa, Peru. Mine office: Ferrobamba, Catobambos, Apurimac, Peru. M. F. Kindersley, chairman; Claude Vautin, managing director and cons. engr.; preceding officers, L. Ross, J. B. Hendry, A. C. Burrage, A. C. Adams and T. C. J. Burgess, directors; W. F. Stevens, mine mgr. Organized Nov. 5, 1909, under laws of Great Britain, capitalization £150,000; 60,000 priority shares, 10s. par; issued, 36,658; 120,000 ordinary shares, £1 par, fully issued. Is registered in Perú. The Ferrobamba property is one of the great copper deposits of the world. It is in central Perú at an elevation of 13,000' above the sea and about 45 miles west of Cusco, the terminus of the Southern railway, 500 miles from Mollendo the seaport. The 207 claims are in 10 groups, covering 2,255 acres, all in the Ferrobamba district, Cotobamba province, Apurimac department, Perú. The deposits show oxidized ores of copper at the surface, underlain by sulphides largely bornite and can be worked by steam shovels.

Property includes valuable water-right concessions, from which it is planned to develop hydro-electric power, the rivers being fed by the melting snows of the Andes. The concessions include water rights to the Rio Chalhuhahuacho and several affluents, and application has been made for similar rights on the Rio Apurimac, about 25 miles in an air line from Ferrobamba No. 1. Including the last named concession, the available water power is rated at 120,000 h. p.

For purposes of development the property has been divided into 5 zones, or groups, known as Ferrobamba No. 1, Ferrobamba No. 2, Katanga, Charcas and Bonanza. Conditions are much the same at these different properties and it is thought that all can be worked opencast.

Ferrobamba No. 1, which includes Ferrobamba Nos. 1, 4 and 5, with area of 900 acres, has been the site of the principal development. This property shows an enormous mass of garnet rock, apparently of contact metamorphic origin, rocks being hornblende-biotite-granite and limestone altered into wollastonite by contact metamorphism for a remarkable distance, in many places up to 3,000' from any recognized igneous contact. Ferrobamba No. 1 is stated to carry 34 hectares of known copper ground, this area having a combined east and west length of 2,300', and north and south length of 1,640'; is estimated by the management to carry ore of payable tenor to a depth of 200', the contents being calculated by the management at 27,635,700 cu. yds., or approximately 12,000,000 tons of ore. Development is by a 100' shaft in chalcoppyrite and bornite ore assaying 6% copper, 3 oz. silver and 9 grains gold per ton. There is also a tunnel, used for a powder magazine, showing ore assaying 4.5 to 9% copper, and samples, at 2-meter intervals, for 100 meters, averaged 5.8% copper, 3 oz. silver and 9 grains gold per ton. Copper values, so far as determined by prospecting, are quite uniform, the average values of 3 oz. silver and 9 grains gold per long ton being remarkably constant. Churn drilling with Keystone drills in progress, from 1910 to 1912, together with underground work in 15 tunnels and the shafts, has proved up 6,000,000 tons of ore averaging 3.7% copper and 1.3% sulphur.

Ferrobamba Nos. 2 and 3, 300 acres, constitute the Sulfbamba mine. Development to Jan., 1913, has proven 778,000 tons of ore carrying 2.25% copper, with 6.75% sulphur and 532,000 tons too low grade to work.

The Katanga or Reina de Cobre mine, area 300 acres, is estimated by Mr. Vautin as likely to rival Ferrobamba No. 1 in tonnage, though but little work has been done thereon. Surface ores, chalcoppyrite and bornite, have given assays of 2 to 7% copper, 2 to 4 oz. silver and 8 to 16 grains gold per long ton.

The Charcas, which is the fourth group, is small, having an area of only

about 35 acres. Mr. Vautin reports an orebody of 100 meters width and 800 meters length, carrying exclusively chalcopyrite, associated with pyrite, suitable for open cast workings, the whole visible face of a bluff of ore assaying up to 24% copper, with an average of 5% copper, 3 oz. silver and 9 grains gold per ton.

The Bonanza claims Nos. 1, 2 and 3, area 420 acres, lying 9 miles south of Ferrobamba No. 1, constitute the fifth group, known as the Bonanza mine. Surface conditions apparently are much the same as at the other properties, but no mining has been undertaken.

Development in 1912 comprised 8,300' of tunnel or adit work and continuous operation of 2 churn drills.

It is stated that the oxidized surface ores as well as the sulphides are amenable to concentration. Extensive testing is reported to have shown that the ore concentrates 11 into 1 with 74% recovery of the product being a mixture of sulphide and oxidized minerals with 30% copper. Considering recent work by Arizona companies, this seems reasonable and as the property can be worked by steam shovels, the deposit is workable. The discovery of iron-copper-sulphide ores in deposits 9 miles west of the mines, supplies a much needed source of sulphur. Property has been examined and reported on by Frank Klepetko and W. H. Wiley. In June, 1913, the property was closed down awaiting railway transportation and the company is exploring properties in the Chumbivilcas district, nearer the railway, held under option.

The company gave an option to Albert C. Burrage, of Boston, in 1911, providing for a new company, to be organized under the laws of New Jersey, capitalization of \$7,000,000, shares \$5 par, such new corporation to give to the Ferrobamba, Ltd., 420,000 shares, or \$2,100,000 in stock, and £250,000 cash, the balance of 730,000 shares, or \$3,650,000, to be subscribed, at par, for working capital, the cash part of the consideration, £250,000, to be payable in 4 equal annual installments, secured by mortgage debentures. This option was not exercised.

Making all due allowances for optimistic estimates, it is obvious that the Ferrobamba is a property of exceptional promise, with good prospects of making a very large low-grade mine, if adequately financed and skillfully managed.

FERROCOBRIZAS; COMPAÑÍA DE MINAS.

SPAIN

Office: San Isidro 16, Sevilla, Spain. Mine office: El Carpio, Cortegana, Huelva, Spain. D. Salvador Sánchez Castañer, agt. Lands, 139 hectares, 16 kilometers from Huelva, including El Carpio and Santa Maria de Gracias mines, latter worked in very ancient days.

El Carpio mines, area 73 hectares, were opened 1856, and have been worked irregularly since, with numerous interruptions. Property was owned, 1890, by Sociedad San Francisco de Paula, and later was held by Bede Metal Co., Ltd., finally coming into hands of this company, and being leased, until 1909, to Société Française de Etudios. Ore is cupriferous pyrite, in a lens 400 meters in length, apparently split, at depth, into 2 orebodies, separated by 40 meters of barren ground. Ores apparently average only 0.75 to 1% copper, but carry 47 to 49% sulphur, and the lower grade ores, of which there are large quantities, carry copper, lead, zinc and bismuth sulphides to the combined extent of 1 to 1.5%. There are also considerable arsenic and antimony, with alumina and magnesia in the gangue, rendering the ore most refractory for the recovery of metallic values. El Carpio mines have 11 old shafts. Equipment includes a small electric pump, and an electric hoist raising 600-kg. cages. Yearly produc-

tion is about 32,000 metric tons of cupriferous pyrite, estimated to contain 500,000 lbs. of fine copper.

FERROL; SOC. ANON. DES MINES DE CUIVRE DU. SPAIN

Office: 13 Rue Auber, Paris, France. Mine office: Ferrol, Coruña, Spain. M. Biver, J. de Catelin, L. A. Claudot, P. Dubois, L. Jumentier, E. Maranzana and G. de Montrichard, directors; H. Dufresne and R. de Thezillar, commissaires. Organized Jan. 25, 1907, under laws of France, capitalization \$5,000,000, shares \$100 par. At last accounts was said to plan reorganization to get out of debt.

Lands, in the vicinity of Cerdido and Moeche, are 28 kilometers from a railway, with carriage rate of 15 pesetas per metric ton. Mine, known as El Porvenir, is opened to depth of about 50 meters, on a 6' vein carrying slightly cupriferous pyrite, claimed by owners to average 50% sulphur. Equipment includes a 15-h. p. gas producer plant and a 16-h. p. electric light plant. Yearly production very small, averaging 300 metric tons of cupriferous pyrite carrying about 5% in copper tenor.

F. G. D. COPPER MINING CO. TASMANIA

Mine office: Heazlewood, Russell Co., Tasmania. Organized about Sept., 1909. Lands are near Heazlewood, about 14 miles northwest of Mt. Bischoff, and about 16 miles west of Waratah. Mine has a vein of about 5' estimated average width, from which a small test shipment, to the Mount Lyell smelter, gave returns of 26% copper, 14 oz. silver and 7 dwts. gold per ton. Was developing with a small force at last accounts.

FIJI COPPER CO. FIJI ISLANDS

Secretary and office: E. G. Masson, 2 Broad St. Place, London, E. C., England. J. Hamilton and P. Bright, directors. Organized Sept. 19, 1912, under laws of England. Capitalization £15,000, shares 2s. par. Property comprises copper-bearing mining areas in the Colony of Fiji, held under option from T. Rimmer.

FINNISH-AMERICAN MINING CO. FINLAND

Office: Calumet State Bank, Calumet, Mich. Operating office: Fennia Bldg., Helsingfors, Finland. Mine offices: Kisko, Abo, Finland and Joensuu, Kupio, Finland. Dr. Aartavara, pres.; Edw. Ulseth, first vice-pres.; Jacob E. Saari, second vice-pres.; Akseli Rauanheimo, sec.; Chas. O. Jackola, asst. sec.; J. H. Jasberg, treas.; Oscar J. Larson, counsel; preceding officers, John Saari and Chas. J. Wickstrom, directors.

Organized Dec., 1906, under laws of Minnesota, capitalization \$750,000, shares \$1 par, as successor of Sampo Mining & Development Co.

Lands, 4 groups, bought of the Fiskars Aktiebolag, including mineral rights, without royalty, to all ores and minerals except iron ore, for the entire estate of about 90 sq. miles and an additional tract, adjoining the Orijarvi mine, was bought, 1910, from the same company. Property has both water and rail transportation. Is now idle.

The Orijarvi mine, about 50 miles from Helsingfors, which is the principal property, was opened A. D., 1757, and mining was continued without interruption until 1875. The property is popularly credited with an output of \$5,000,000 in copper and silver. The Orijarvi shows slight surface indications of the large orebodies below, these lying in silicious limestone near an intrusive quartz-diorite contact, ore being chalcopyrite, sphalerite and occasional galena, all more or less auriferous and argentiferous, associated with pyrrhotite. The Orijarvi tract is a parallelogram of approximately 2 by 5 miles, and the old mine was opened very peculiarly, by a series of truncated conical caves, with apexes at surface, openings gradually increasing in diameter with depth, there being no drifting. The old workings show stopes up to 60' wide. Diamond-drill borings, with 8

holes, have shown the orebodies to continue beneath the bottom of the old workings. The mine has 9 shafts, deepest 500', with levels at 100' intervals. The old stockpile carried upwards of 30,000 tons of zinc and lead ores discarded from previous operations, but probably of present value, as a zinc smelter could be built at a reasonable cost if shipping were found impracticable. Equipment at the Orijarvi includes a steam plant with a good modern hoist and air compressor.

The Illijarvi mine, area 3 sq. miles, bought 1909, adjoins the Orijarvi. The old workings, about one-half mile from the Orijarvi mine, show a well mineralized vein, carrying silicious chalcopyrite, similar to that of the Orijarvi, but with higher gold values.

The Hokka and Kykka mines are included in the mineral claims taken up in 1909 near the Illijarvi. The Hokka mine, carrying a continuation of the Orijarvi orebody, was opened 1850, and has two 125' shafts, developing slightly argentiferous and auriferous chalcopyrite of good average tenor, with quartz gangue. The company has made 650' of new openings on this property. The Kykka shows conditions much similar to the Hokka.

The Brödthorp mine, 4 miles from the Orijarvi, in the parish of Johja, near Skuru, has an area of 20 sq. miles, with mineral rights to the entire tract, save for iron ore. The Brödthorp, carrying a contact deposit between diorite and quartzite, has a 100' shaft showing a complex mixture of copper, lead and zinc sulphides, zinc predominating. The Brödthorp shows numerous ancient pits and trenches, with 1 shaft of about 125' depth.

The Kerkela mine, in the parish of Enare, Finnish Lapland, about 100 miles from a railroad, has a fissure vein carrying free-milling gold ore, of good average assay tenor. The company also has options on iron properties, in northern Finland, carrying magnetic ore assaying up to 69.5% iron.

The Orijarvi mine is 10 miles from the state railroad at Turku, but the management plans building a private line, of either 5 or 10 miles, to a seaport, the longer route having a wharf at its terminus. The mill site is on Lake Orijarvi, 5 miles from the Orijarvi mine, and mill is now erected.

About 75 men were employed, at wages of 50 to 80 cts. per day, labor being abundant, good and cheap.

Local prejudice, taking the form of legal obstruction, increased and annoying taxation and innumerable petty interferences has hindered operations, discouraged the company's backers and caused a lack of confidence in the company's ability to carry out its plans. After having spent \$250,000 and demonstrated that the property could be made a success, the company has been forced to suspend operations and is now both idle and out of funds.

FINNISS RIVER COPPER MINE.

Owned by Doolette & Co., C. C. Gibson, mgr. Property at Rum Jungle, near Port Darwin, Northern Territory, Australia, is prospecting by Government aid. A 317' diamond-drill hole, made in 1913, showed a large but low-grade copper-bearing formation underlain by crystalline limestone. A second drill hole was being put down in August.

FITZROY MINE.

Owned by Great Fitzroy Mines, Ltd., which see.

FLAAD MINE.

Address and smelter office: Evje, Salters dal, Norway. Property is an old copper mine, now worked for both nickel and copper, being the only working nickel mine in Europe. Mine on steep hill, 500' above valley, 3 miles from Evje village. Ore, consisting of chalcopyrite and pyrrhotite, occurs as spots and dissemination in edge of a mass of novite intrusive in hornblende, gneiss penetrated by granite. The ore lens is 67' long at

NORTHERN TERRITORY

QUEENSLAND

NORWAY

surface and 330' long at 530' depth, dipping at 45°. It averages 1.2% copper and 2.3% nickel.

Development is by 530' shaft with 115 tons daily output sent by 3-mile wire rope tram to smelter. Smelter plant at Evje mattes the ore and refines the metal by Hybinette process.

FLAG GOLD & COPPER MG. CO., LTD. WESTERN AUSTRALIA

Office: Morgans St., Ravensthorpe, Western Australia. Mine office: Kundip, Phillips River Goldfield, Western Australia. Walter Dunn, chairman; Chas. Grant, mine mgr.; preceding officers and John T. Hassell, directors; Ralph Anderson, sec. Organized March 14, 1907, under laws of Western Australia, capitalization £25,000, shares 5s. par.

Property, a gold mine having copper ore, located in the Phillips River field, comprises 70 acres held under a gold mining lease, and options and leases on the Harbour View and Little Wonder mines. Mine has a 6' vein from which former owners shipped 1,222 long tons of ore yielding 39 long tons fine copper and 889 oz. gold. Copper ore carries 4 to 15 dwts. gold and a little silver per long ton. Mine has a 325' main shaft, with 2 other shallow shafts, poorly laid out, and is wet, having an 8" Cornish pump with 48" stroke, and pumping engines with two 14" cylinders. There is an old 5-stamp mill. Production, for April, 1910, was 613 long tons of ore raised, of which 136 tons was copper ore of smelting grade, shipped to the Phillips River smelter, and 477 tons milling ore, 300 tons milled returning 146 oz. gold from the plates. Copper production for 1911 was but 3,500 lbs., all from the Little Wonder mine. Total production to end of 1911 was 144.75 tons metallic copper valued at £8,494, besides 128.5 tons, valued at £7,191, from the various Harbor View leases. Idle in 1912.

FLINDERS COPPER MINE.

NORTHERN TERRITORY

Is 4 miles from Tumby bay. Shows 3 veins, northernmost being 1 to 3' thick, developed by 210' shaft and showing bunches of sulphide ore. Stopes and drifts at 60' and 100' gave 17% ore when sorted. Center vein, 1½' wide, is unproven. The south vein, developed by 60' shaft, gave shipment of 25% copper with gangue of iron-stained quartz. Mine was shipping 15 to 20 tons of rich ore weekly from Beltana, Farina and Parachilna to the Wallaroo smelter.

FLOR del BOQUETTE; MINA.

CHILE

Producing 60 tons of 15% copper ore monthly, March, 1913.

FLORODORA MINE.

QUEENSLAND

Mine situated about 30 miles west of Cloncurry and contains a sulphide lode which, though small, is very rich in copper contents.

FOLDAL COPPER & SULPHUR CO., LTD.

NORWAY

Office: 6 Old Jewry, London, E. C., England. Mine mgr. and office: W. H. Lund, Foldal, Lille-Elvedal, Norway. Alex. Davidson, chairman; Leigh Hoskyns, J. P.; Sidney St. J. Steadman, J. A. Stirling and E. Hooper, directors; Chas. Forbes, sec. Organized Jan. 27, 1906, under laws of Great Britain, capitalization £350,000, shares £1 par, in £150,000 preferred and £200,000 deferred stock. Company has invested £377,500 in its property, development and equipment. Accounts, for year ending Feb., 1911, showed £3,201 profit.

Lands, about 3,000 acres, at Foldal, Norway, carrying considerable timber, and including 5 old mines, known as the Juliana Marie, Knutshovd, Foldal, Grev Moltke and Grimsdal, worked for about 150 years, during which time 350,000 tons of ore was produced. Mine, opened mainly by tunnel, with 2,660 meters of workings, shows a vein of about 12' average width, carrying massive cupriferous pyrite, with only traces of arsenic, vein giving every indication of persistence and ore being estimated to

average 2% copper and 46% sulphur. Property also has some ore of high copper tenor that eventually may become of some importance. Ore produced is divided into 3 classes, first grade averaging 2.12% copper and 48.17% sulphur, the other grades carrying less copper and slightly less sulphur.

Equipment includes an excellent mining plant, installed at a cost of £105,000, and company has expended about £22,000 for substantial mine buildings. A large waterfall, on the Einuna river, held under a 25-year lease, subject to renewal, at annual rental of £25, has been improved with a hydro-electric power station. Good wagon roads have been built.

A 22-mile Pohlig aerial tram, which is one of the longest in the world, built at a cost of £38,412, runs from the mines to the Lille-Elvedal railway, and has a capacity of 40 metric tons per hour. Miscellaneous improvements include a telephone line, and a quay at Trondhjem, for ore shipments.

Production was 41,680 metric tons of cupriferous pyrite for year 1908, and 71,000 metric tons in 1909. In 1912 company produced 72,000 tons of ore, average value being 2.3% copper and 45% sulphur. Ore in sight, Feb., 1911, estimated at 650,000 tons. Equipment has been provided for an ore production of about 100,000 tons yearly. Copper production is estimated at 1,500,000 lbs., 1909. Property considered promising and management good.

FONDERIES ET LAMINOIRS; SOC. ANON. DES.

FRANCE

At Biache, St. Vaast, France. Property is an electrolytic copper reduction plant having five 6-kw. generators and 100 tanks, in multiple arrangement of electrodes, with an estimated daily capacity of 2 metric tons fine copper.

FORASTERA MINES, LTD.

ARGENTINA

At Chilecito, Rioja, Argentina. Is a subsidiary of the Famatina Development Corporation, Ltd.

FORT BOURKE COPPER MINING CO., N. L.

NEW SO. WALES

Mine office: Cobar, Robinson Co., N. S. W., Australia. Organized 1908, capitalization £5,250. Mine has a 104' shaft, developing complex ores, difficult of reduction, and a mill, erected 1908, has not given satisfactory results. A new 174' shaft and crosscut passed through zone containing copper lode with abundant quartz, but operations were suspended at this point because inflow of water was too great to handle.

FORTUNATAS MINE.

QUEENSLAND

Situated at Harpers Hill, Mt. Perry district, Queensland. Now idle but plans resumption of work, 1913.

FOSGRUBE KOBBERGRUBER.

NORWAY

H. & F. Bachke, owners, Trondhjem, Norway. Mine address: care H. & F. Bachke, Drontheim, Norway. Mine situated in Tolgen parish, about 20 miles southwest of Røros, carries non-zinciferous, cupreous pyrite of better than average grade, devoid of arsenic, etc.; is under development. A nearby waterfall furnishes hydro-electric power. The mine was selected for exploration out of a group of 25 old mines or claims of same ownership and in same district.

FRANCAISE DES MINES DE CUIVRE; SOCIÉTÉ.

CHILE

Owns Collahuasi mine. See Société Française d. Mines de Cuivre, this volume.

FRANCARDO; SOC. DES MINES ET FON. DE.

CORSICA (France)

Mine at Francardo, Ajaccio, Corsica. L. Bizouarne, mgr., at last accounts. Organized Oct. 30, 1905, under laws of France, capitalization

f 600,000, increased later to f 3,600,000, shares f 100 par. Paid, 1906, a 10% dividend.

Owens the Morosaglia, San Lorenzo and other old copper mines, whose veins are claimed to carry orebodies that average 7% copper. Apparently the production of cupriferos pyrite is sent to French smelters for smelting. Company employs about 600 men.

FRANKLIN COPPER & LEAD MINING SYND. SOUTH AUSTRALIA

In liquidation. A. G. Kimber, liquidator, 69 National Mutual Bldg., King William St., Adelaide, South Australia.

FREMANTLE TRADING CO., LTD.

WESTERN AUSTRALIA

Office: Salisbury House, London Wall, London, E. C., England. Mine office: Northampton, Western Australia. Works office: Fremantle, Western Australia. E. Protheroe Jones, A. E. Lund and J. A. Morris, directors; E. H. Woolcott, sec.; W. G. Sutherland, mgr. Organized July 28, 1909, under laws of Great Britain, capitalization £50,000, shares £1 par, in £20,000 preference and £30,000 ordinary shares; fully issued; ordinary shares fully paid, preference shares 12s. 6d. paid. Mines, at Northampton, were discovered, 1842, and have orebodies parallel with basic igneous dikes, carrying copper and lead sulphides, with occasional sphalerite. The smelter, at Robb's Anchorage, near Fremantle, does a limited custom business.

FROLOV (SKY) MINE.

RUSSIA

Turinsky, Ural district, Russia. Mine is one-half mile southeast of the village of Turinsky. Ore occurs at contact with dikes of augite-granite rocks and limestone, oxidized for 70' down, with sulphides in garnet gangue below. Values buncy and irregular.

FRONTON; MINA.

CHILE

Owned by Société des Mines et Usines de Cuivre de Chañaral.

FUJITA CO. (GOMEI KWAISHA FUJITA-GUMI).

JAPAN

Office: 180 Dojima-Kitamachi, Osaka, Japan. Mine office: Kosakamura, Kanzuno-gori, Rikuchu, Japan. Heitaro Fujita, chairman; Yoichi Katsura, gen. mgr.; Kennosuke Tsujimoto, cons. engr.; Yoji Kimura, mine mgr.; Saichi Saito, mine supt.; Manroku Yonezawa, smelter supt. Company was founded, at Osaka, 1869, by Baron Fujita, and was organized, 1875, under laws of Japan, and capitalization increased later to present figure of 6,000,000 yen. Profits, 1906, were estimated at 3,000,000 yen. Mining was begun in 1880. This is one of the largest private companies in Japan.

Lands are extensive, including the Kosaka, Omori, Tokito, Daiji, Towada, Matsuoka and Zuiho mines, with some 25 other mines that are idle, or in an exploratory stage. The company also is engaged extensively in forestry and agriculture. Company employed 8,295 mine workmen, of whom 1,377 were underground and 6,918 on surface, at last accounts.

The Kosaka mine, which supplies nearly 20% of the copper produced by Japan, is located at the extreme northern end of Hondo, the main island of Nippon. The mine, in a very rugged district, about 10 miles from the government railway, was worked until 1897 as a silver mine, passing, 1884, to the present ownership. The Kosaka employed 7,642 hands, 1908.

Country rock is brecciated porphyry tuff, ranging from a fine conglomerate to a coarse grit, of Tertiary age, with a covering of volcanic ash, and with intrusions of liparite and andesite, a narrow liparite dyke cutting the breccia and sedimentary rocks. The orebodies constitute a fine example of metasomatic replacement, occurring along the contact zone between the tuff and andesite, as impregnations of tuff near a dacite contact, occurring apparently as blanket veins, lying at an angle of about 45°, with a

diorite footwall and hanging of andesite tuff, latter well defined, but ore shading imperceptibly into the footwall. There are 5 of these orebodies, of immense size, ranging from 20 to 270' in thickness, and proven for a length of one-half mile, while drill borings have proven the formation to continue to a depth of 1,700'. The area of the deposit so far explored is 2,000' long, 800' wide and 500' deep. There are three kinds of ores, the complex sulphide, pyrite, both compact and loose, and silicious ore. They carry much barite. All ores are more or less argentiferous, and the product is divided into 3 grades. First-grade ore the complex sulphides, averages 2.43% copper, 2.28% lead, 9.8% zinc and 15.64% iron, with 0.02 oz. silver per ton, and from a trace to 65 cts. gold per ton, the gangue carrying 40 to 45% barium sulphate. The pyritic ore, which is the second grade, averages 2.34% copper, 0.47% lead, 3.15% zinc and 26.83% iron. The silicious ore, which is the third grade, averages 1.27% copper, 0.26% lead, 1.48% zinc and 19.44% iron.

The Kosaka is mined through tunnels. The slicing and filling system is used, but underground mining was practically abandoned, 1908, for open-cast workings, similar to those of the Rio Tinto. From 1,000 to 1,800 cu. yds. of overburden are removed daily, the entire overburden being estimated at about 4,000,000 cu. yds. Stripping is by manual labor, with electric trolleys to remove material.

The open pit is of funnel shape, about 1,000x2,000' in size, with the sides terraced. The Kosaka was estimated, 1908, to have fully \$30,000,000 in ore values developed. Owing to extraction of ore by tunnel and open-cast workings, only about 200-h. p. is required at the mine. Equipment includes two 8-drill Leyner air compressors and an electric pump on the 500' level.

The smelter, 1¼ miles from the mine, with electric rail connections, is of about 1,000 tons daily capacity and is thoroughly modern in design and equipment. There are 8 Herreshoff calcining furnaces, of which 6 are used on ore, 1 on matte and 1 on slags. There are 7 rectangular water-jacket blast furnaces, 6 of small size and 1 a monster of 3' 6" width and 60' length, 28' 6" in height, with water jackets 7' 5" high. Of the smaller blast furnaces, 2 are used for matte, 2 for casting anodes, 1 for casting blister copper and 1 for casting ingots and cakes. Semi-pyritic smelting is employed, fuel charges averaging only about 3%, with a cold blast, at pressure of 10 oz. per square inch. A judicious mixture of the 3 grades of ore produced affords a self-fluxing furnace charge, the average of all ores being only about 2% copper, with small gold and silver values. The ore being zinciferous, the copper slags contain considerable zinc values, now lost, on which experimental work is in progress.

The first-fusion product is a copper-lead matte of about 30% metallic tenor, carrying about 20% copper and 10% lead, which is resmelted for a second-fusion product of about 50% metallic tenor. The slag from the second matte contains quantities of lead and copper and is resmelted and the lead extracted as bottoms, which are taken to a liquation hearth and the lead desulphurized in a Parks sintering pot. The zinc scum, containing silver and gold values, is retreated, and the residue, together with the slimes from the electrolytic tanks, are treated in a cupel furnace, producing doré bullion. The second-fusion matte is crushed, calcined in Herreshoff roasters, and resmelted in reverberatory furnaces to blister copper, but a converter plant was installed, 1910, to replace the reverberatories. The slag from the final smelting is essentially an iron and barium silicate. Blister copper from the reverberatory furnaces is cast into anodes, and taken to the electrolytic refinery for treatment.

The converter plant has 2 stands, with 8 shells. There are 2 Brown-

Boverie-Rateau air compressors, a complete lining department, and a 140-ton electric crane. Power is furnished to the converter department by a 1,000-h. p. electric plant. Blister copper from the reverberatories is refined electrolytically, the product being copper of the exceptional purity of 99.95%.

Power is all electric, the Kosaka installations aggregating 12,450-h. p. for the mine, smelter, shops and rail lines. It is generated by 4 hydro-electric stations, on the river Oyu, near the mine.

The company owns and operates a private electric railway, with 8 miles of main line, equipped with 10 locomotives and 400 three-ton ore cars. Electric trolley lines reach all principal points at the mine, smelter and shops, and connect with the government railway at Odate. Fuel for the mine and smelter is brought by aerial tram.

Recent production of the Kosaka has been as follows: 13,984,768 lbs. fine copper in 1905; 14,811,152 lbs. in 1906; 16,397,061 lbs. in 1907; 15,720,153 lbs. copper, 835,174 lbs. lead, 1,127,000 oz. silver and 10,900 oz. gold in 1908; 13,702,000 lbs. copper, 1,024,000 lbs. lead, 1,048,632 oz. silver and 11,109 oz. gold in 1909; 13,594,000 lbs. copper, 1,428,000 lbs. lead, 1,282,290 oz. silver and 13,180 oz. gold in 1910; 13,162,742 lbs. copper in 1911 and 17,590,151 lbs. in 1912.

The Tokito mine is at Nanatini-mura, Kazuno-gori, Rikuchu, in the vicinity of the Kosaka. The mine has a 165-h. p. installation and, employing an average of 375 hands, produced 619,090 lbs. fine copper, without gold or silver values, in 1908; 653,219 lbs. copper in 1911, and 395,521 lbs. in 1912.

The Daiji mine, at Nanatini-mura, Kazuno-gori, Rikuchu, has only a 75-h. p. steam installation, employing an average of 234 hands in 1907 and 117 hands in 1908 and produces copper ore without gold or silver values. Production was 219,650 lbs. fine copper in 1907, and 165,158 lbs. in 1908.

The Towada mine, also near the Kosaka, was opened A. D. 1670, and has a vein of 30 to 100' width, carrying disseminated auriferous chalcopryrite and argentite.

The Omori mine is at Omori-mura, Nima-gori, Iwami, Japan. The mine was opened A. D. 1300, and reopened A. D. 1525. The mine once was highly productive but was closed, 1872, by an earthquake and reopened, 1884, by the present company. The Omori, in a rugged district, near the coast, has Tertiary tuffs and sandstone, with andesite dikes, carrying parallel fissure veins of 3 to 7' width, some traceable 2,000', and is divided into the Eikyu group, carrying mainly auriferous and argentiferous chalcopryrite, associated with galena and sphalerite, and the Hontani group, carrying malachite and argentite, with some native silver. Five veins are now being worked, ores therefrom giving an average assay of 7.75% copper, 0.8% lead, 0.056% silver and 0.0014% gold. Average forces, 1908, were 675 men, including 682 miners.

The reduction plant includes a mill with crushers, rolls, trommels and jigs, a smelter having stall furnaces for calcining and a cylindrical water-jacket blast furnace, employing semi-pyritic smelting, matte being resmelted to blister copper by the Mabuki process. Production, which was only 80,139 lbs. fine copper, 16,202 oz. silver and 381 oz. gold in 1900, has been increased steadily, and was 697,083 lbs. copper, 9,184 lbs. lead, 96,764 oz. silver and 1,694 oz. gold in 1908; 824,089 lbs. copper in 1911 and 847,746 lbs. in 1912.

The Matsuoka mine, at Nishitaka-mura Kita-Akita-gori, Uzen, is a small gold and silver mine, which was worked in the eighteenth century by Sato Shinyen, a famous miner and metallurgist, to whom modern

mining in Japan is greatly indebted. Production was 177,625 lbs. copper in 1911 and 226,266 lbs. in 1912.

The Zuiho mine is 8 miles east of Keelung, in the northern end of the island of Formosa. This mine, discovered in 1890, was bought by Fujita-Gumi & Co. in 1895, and has been developed into perhaps the most famous gold mine of the empire. Equipment includes a 320-h. p. steam plant, a 165-h. p. water-power plant, and a 30-h. p. electric-light plant. The mill has a Huntington mill and cyanide plant. In 1908, with an average force of 331 employes, production was 28,411 tons of ore, yielding 4,177 oz. silver and 9,047 oz. gold.

The Kosaka mine, notwithstanding the extremely low average tenor of its ores, is the second largest copper producer in Japan, and is one of the greatest copper properties of the world in potential production, owing to the enormous size of its orebodies. The Fujita Co., or Gomei Kwaisha Fujita-Gumi, includes some of the strongest financial and commercial interests of the empire and is exceptionally enterprising and capable in the management of its mines and works.

FUKADA MINE.

JAPAN

Mine at Fukada-mura, Kuma-gōri, east of Hitoyoshi, Higo, Japan. Country rocks are alternate strata of sandstone and clay-slate, of Paleozoic age, orebody having strike and dip corresponding to country rocks, and ranging 5 to 10' in thickness. Ore is chalcopyrite, associated with pyrite, averaging 5 to 6% copper. Production, about 15,000 lbs. copper, 1896-1910. No recent returns from mine.

FURUKURA MINE.

JAPAN

Owned by Furukawa Mining Co.

FURUKAWA MINING CO.

JAPAN

Office: 1, Yayasucho, Itchome, Kojimachi-ku, Tokio, Japan. Smelter office: Yama-moto-gori, Akita-ken, Shimotsuke, Japan. Work offices: Kamitsuga-gori, Tochigiken, Japan. Toranosuke Furukawa, pres.; Choschichi Kimura, managing director; preceding officers, Rokusaburo Kondo and Kunisuke, Obazaki, directors; Bunjiro Konda, sec.; Kametaro Iijima, treas.; Matsuki Otagawa, mgr. Baron Kumakichi Nakashima, chief of commercial dept.

Company owns the Ashio, the largest copper mine in Japan and 14 other large mines whose addresses are given in the description of each mine.

Company is a close corporation. Organized April, 1905, in Japan, capitalization 5,000,000 yen; fully issued and fully paid. The business was founded in 1876, by the late Ichibei Furukawa, succeeded, 1903, by Jun-kiche Furukawa, Mr. Toranosuke Furukawa succeeding, as head of the firm, in 1906. The company employs 1,400 officials and 22,000 men. Lands are about 26,500 acres, and yearly production, in addition to copper, is about 700,000 oz. of silver, with a little gold, 500,000 tons of coal, and 30,000 tons of coke. Properties include 8 copper mines, 1 silver mine, an extensive copper manufacturing plant, several collieries and a large and modern coke plant. The various copper mines and their works are described in detail, in the following pages.

The Ashio mine is at Kamitsuga-gori, Tochigi-ken, Shimotsuke, 11 miles west of Nikko and about 100 miles northwest of Tokio. Koji Inouye, gen. mgr.; Kazuye Kibe, mine supt.; Kosaku Asano, smelter supt.; Jintaro Kojima, engr. The Ashio mine was discovered A. D. 1609, and became a producer in 1611, reaching a productive capacity of about 1,500 tons of copper yearly, during the latter half of the seventeenth century, rendering it one of the largest, if not the largest copper mine, of the world, in that

era, and, as the output was in excess of domestic demand, the surplus was exported to Holland. In 1871 the property was in private hands and when it came into the possession of the late Ichibei Furukawa, in 1867, was in such poor condition that its yield was only about 50 tons of copper yearly, but, by prudent management and thorough development, coupled with the introduction of modern methods and machinery, was made the foremost copper mine of Japan. Forces averaged over 7,000 men in 1911, with 3,000 men underground.

The Ashio mine comprises a tract of 1,500 acres, with 3 mines, known as the Honzan, Kotaki and Tsudo, lying within a distance of 3 miles. The mountain which contains the mine is a volcanic plug or neck of liparite, upthrust through Paleozoic rocks and carries more than 300 different veins, in several different groups, with different strikes and mainly sharp dips, averaging about 75° with the horizon. There are 2 series of fissures that intersect, forming rhombic nets of veins, which are narrow, carrying chalcocopyrite, sphalerite and galena, associated with arsenopyrite and pyrrhotite, with mainly quartz gangue. About 70 different veins are more or less developed and are reported by the company as averaging about 3' in width, and 1,200' in length, some having been proven to depth of 2,000'. Principal veins are the Yokomuhu, 6,000' long, and the Kosei, 3,000' long. The oxidized zone shows occasional native copper, cuprite, azurite and malachite, and the secondary zone carries bornite and chalcocite, with quartz gangue and occasional alumina, principal ore values being in the sulphides. The management estimates the ore to average about 3% copper, with small quantities of silver and gold. Rich ore is sorted underground and brought up to about 12% in copper tenor, while second-grade ore is said to average only about 1% copper.

Working is carried on by 3 long tunnels and the 3 mines are connected underground. The Honzan and Kotaki tunnels connect; the Tsudo tunnel is 450' lower than these; below the Tsudo are 8 levels 110' vertically apart. Workings extend for over 1,100' above the Honzan tunnel level, giving a total depth to the mine of 2,500'. Each mine is connected, by ground tram, with its own dressing plant. The Honzan mine has the 6,000' Honkuchi drift tunnel, and 4 shafts, No. 1, 450'; No. 2, 740'; No. 3, 910'; No. 4, 280'. The Kotaki mine has the 7,000' Ariki drift tunnel, the 6,000' Kotaki drift tunnel and the 600' Sunoko-Bashi shaft. The Tsudo mine has a 1,000' crosscut tunnel, 11' high and 13' wide, with 3 shafts.

The Ashio mines as a whole have about 100 miles of workings and produce daily about 800 long tons of ore, broken mainly by overhand stopping, generally with hand drilling, but with some use of water Leyner and Little Wonder power drills for drifting and sinking. The mines are solidly timbered and the principal workings are electric lighted. There are 14 pumps aggregating about 600 h. p. The system of natural ventilation is aided by regulating doors and occasional brattices, with centrifugal fans for the lower workings. The mine has electric hoists, and electric haulage plants in the Ariki, Kotaki and Tsudo tunnels.

The ores of the mine are separated by hand picking into first-class 12% ore, bagged for shipment to the smelter, and second-class ore, averaging 1% copper, sent to concentrating mills. Hand picking is by women, whose wages are about $12\frac{1}{2}$ cts. per day.

Machinery equipment at the mine is modern throughout, with mainly American and German machinery. Each of the 10 shafts has a hoist, 9 having electric double-drum hoists, of 35 to 100 h. p., good for depths of 540 to 1,000'. There are 7 air compressors of 2 to 7 drill capacity, with aggregate capacity of 22 drills.

Equipment of the different mills includes 12 grizzlies, 18 picking tables, 78 trommels, 5 Blake crushers, 1 Dodge crusher, 5 stamps, 6 sets of rolls, 2 sets of Sturtevant centrifugal rolls, 111 Hartz jigs, 24 hydraulic classifiers, 16 settling tanks, 5 Wilfley sand tables, 11 Overstrom tables, 9 Evans slime tables, 2 Wilfley slime tables, and 7 conveying belts. The bulk of the ore is concentrated to about 15% copper tenor. The newest plant, erected in 1912, is at the portal of the Tsudo tunnel; it differs only in detail from the other mills, but has double cone classifiers and Callow screens. A peculiarity of the plant is the succession of settling dams in which the waste water from the mills is neutralized by lime and sand filtered; the copper recovered pays the cost and the water is fit for agriculture. In connection with the mills are small leaching plants, yielding a daily average of 2,400 kgs. of 58% cement copper.

The Ashio smelter, of 300 tons daily capacity, completed 1904, has three 100-ton 42x160" water-jacket blast furnaces, with 3 No. 8 Connorsville blowers. The average product smelted contains 12% copper, 28% iron, 25% sulphur and 32% silica. Lump ores are charged raw and fines are sintered. The sintering plant has pot-roasters of conical shape, made of iron plates, with false bottoms, taking 7-ton charges, which are cooled and crushed after sintering. The plant has 12 pots, in 2 rows, used alternately. Furnace product is a 37% matte, with slags averaging 0.2% copper. The smelter has a special dust chamber for the condensation of fumes which, after the precipitation of dust, enter a common flue and go to the bottom of a desulphurizing tower where sulphurous acid gas is absorbed by sprays of limewater. Smelter fuel is coke, costing an average of 24 yen per metric ton, with a yearly consumption of 4,150 tons.

The converter department has a 40-ton electric traveling crane, 2 stands with hydraulic tilting gears and six 72x100" shells, of barrel type, with 11 tuyeres each. The converter plant has 2 horizontal blowing engines, electrically driven, and 1 vertical engine, driven by water power, furnishing air at 10 lbs. pressure. A peculiarity of smelting practice is the feeding of coal through the tuyeres of the blast furnace when needed to promote smooth running. There is a silica mill, using decomposed liparite for linings. The converters cast 70-lb. ingots, averaging 99.108% copper, 0.15% silver and 0.00045% gold. The converter copper is refined at Nikko, in the company's own refinery.

The briquetting plant has 2 processes for briquetting fine ore, patented in Japan and the United States, 1 providing for the making of balls of fines, surrounded in the moulds by molten matte, the second process providing for a mixture of dried fines and molten matte in the pots. Cost 30 cts. per ton.

Smelter fumes are practically eliminated by four 40' steps in the big inclined flue lying on the steep mountain side, in which a solution of lime-water from an iron plate with 200 c.m. holes rains down on the gases and eliminates sulphurous acid.

The Ashio uses electric power throughout, employing 2,500 kw. at the mine, 370 kw. at the mills and 450 kw. at the smelter. The Hosoo hydro-electric plant is 12 miles from the mines, developing 7,500 h. p. In addition to the Hosoo plant, there are 11 other smaller water-power plants, up to 900 h. p. in size, with a total capacity of 2,550 h. p. Electric current from the hydro-electric plants is transmitted, at high voltage, to 3 stations, and there stepped down for use at the mine, mills and smelter. The government returns credit the Ashio with power installations aggregating 18,884 h. p.

The Ashio is 11 miles west of Nikko, the nearest station on the Imperial

Government railway, a very rugged country intervening. Transport between Nikko and Ashio, which was formerly by bullock wagons and aerial trams, was replaced in 1910 by an electric trolley line, built by the Ashio Tramway Co., connecting the mines with Kiryu station on the government railway line. The aerial tram system includes 2 lines, each of about 19,500' length, having some very long and high spans, crossing the crest of the mountains between Nikko and Ashio. There also are subsidiary aerial trams, including lines of Bleichert, Hallidie and Tamamura manufacture, with a total capacity of about 1,300,000 ton-miles yearly. The Ashio Tramway Co., controlled by the Furukawa Mining Co., has 25 miles of electric railway.

Cost of the Ashio copper is probably a trifle above 9 cts. per lb., finished. Production has increased but slightly during the past 10 years, having been 13,402,730 lbs. in 1900; 14,830,192 lbs. in 1906; 14,023,246 lbs. in 1907; 15,467,578 lbs. copper and 82,903 oz. silver in 1908; 15,631,326 lbs. in 1910; 16,758,200 lbs. in 1911 and 20,921,987 lbs. copper in 1912.

The Ani mines are at Kita-Akita-gori, Akita-ken, Ugo, on the western slope of the Moriyoshi mountains. Shigeo Kasai, mine mgr. The Ani is a group of 5 old mines, known as the Kosawa, Kayakusa, Magi, Sammai and Ichinomata. These mines have an area of upwards of 3,000 acres, in a distance of about 5 miles, and were modernized about the beginning of the twentieth century. The group shows Tertiary sedimentaries, liparite and andesite, the Tertiary rocks being chiefly altered tuffs and tuffaceous shale, with 2 series of veins traversing the entire formation, one with east-west strike, and the other with north-south strike, cutting each other, the former with numerous veins, not wide nor long, the latter with few but strong veins. The oxidized zone is deep, carrying native copper, malachite and chrysocolla, succeeded by a secondary zone carrying some bornite and chalcocite, the primary zone carrying chalcopyrite with occasional galena and sphalerite, associated with pyrite, with gangue mainly quartz, and occasional quartzite and barite. Both copper and lead ores are argentiferous, considerable silver being secured as a byproduct. In 1907 the Ani group employed an average of 3,108 persons. The Kosawa mine was discovered A. D. 1670, the others a little later, and the group was purchased by Ichibei Furukawa in 1885. The Kosawa mine has 2 tunnels and a blind shaft, and the Kayakusa mine also has 2 tunnels and a blind shaft. The Magi mine has 2 tunnels and the Sammai mine 3 tunnels. The Ichinomata mine has a 6,600' tunnel, which is the main transportation and drainage tunnel for the entire Ani group.

The Ani has 10 small dressing plants, producing 10% concentrates, with aggregate capacity of only 54 tons of ore daily.

The Ani smelter, known as the Shinonome works, at Yamamoto-gori, Akitaken, Ugo, of 75 tons daily capacity, has stall furnaces for roasting, the process requiring 3 weeks. There is a 45-ton 36x100" oval blast furnace, and a 30-ton 36x65" rectangular water-jacket blast furnace, with 2 No. 6 Connorsville blowers, supplying air to the blast furnaces and Mabuki hearths. First-fusion product is a 40% matte, which is tapped into matte pots and charged into 7 Mabuki hearths, each taking 7,000-lb. matte charges, requiring 24 hours for reduction, and turning out blister copper averaging 98% copper and 0.11% silver, sent to the Nikko works for electrolytic refining. This plant also produces 225,000 lbs. of pig lead yearly.

Power is furnished by a 1,000-h. p. hydro-electric plant built, 1910, at Hitachinai. There is a light railway connecting the mine and works on the Ani river, with the station of Futatsui on the Imperial railway.

Production of the Ani was 2,498,646 lbs. fine copper and 44,610 oz. silver in 1907; 2,849,687 lbs. copper and 49,630 oz. silver in 1908; 3,681,424

lbs. copper and 50,000 oz. silver in 1910; 2,659,774 lbs. copper in 1911 and 2,579,580 lbs. copper in 1912.

The Kusakura mine is at Higashikambara-gori, Niigata-ken, Echigo. S. Gamoh, mgr. Lands are about 600 acres. The mine was discovered A. D. 1739, and bought, 1876, by Ichiberi Furukawa, being his first venture in copper mining. The Kusakura has Tertiary sandstone, shale and tuff, with liparite and andesite dikes and sheets, carrying 4 nearly parallel main veins, which are richest in the sandstone and leanest in shale and tuff. There are 3 veins, longest 2,500', of 2" to 6' width, with an average of 12", having numerous branches. The upper workings show native copper and cuprite, succeeded by bornite and chalcocite in the secondary zone, followed by chalcopyrite, associated with pyrite and but rarely with galena and sphalerite, with scanty quartz gangue, ores carrying no appreciable gold or silver values. The mine is developed by 4 tunnels, and employed, 1908, an average of 489 hands.

The Kusakura has small steam and hydro-electric plants, aggregating 253 h. p. Transportation is by a railroad. There is a small mill, with hand-dressing, giving a daily product of 7 tons of 12.5% selected ore. The 40-ton smelter has two 20-ton 30x60" blast furnaces, making 40% matte, and 3 Mabuki hearths, using heavy petroleum, this being the first smelter in Japan to use liquid fuel for metallurgical work. Production has shown a decline during the past decade, being 373,118 lbs. in 1911 and 180,515 lbs. in 1912.

The Furokura group is at Kazuno, Rikuchu. Lands are about 2,200 acres, including the Furokura and Hosoji mines. The Furokura was discovered A. D. 1681, and purchased 1887 by I. Furukawa, and the Hosoji was opened in 1904. The Furokura was idle, 1794 to 1868, when reopened. Property is 22 miles from the nearest railway, with a good wagon road connecting. Forces average 700 hands. There is a 275-h. p. power installation. Lands show Tertiary tuffs, shale and andesite, traversed by numerous fissure veins, carrying chalcopyrite associated with pyrite, and rarely with sphalerite and galena, with quartz gangue and clay gouge. The Furokura mine is opened by 2 tunnels and 2 incline shafts and the Hosoji mine has 5 levels, 70 to 80' apart, connected by winzes.

The Furokura works, on the opposite side of the mountain from the mines, include a mill and smelter. High-grade ores are screened and hand-picked, low-grade ores being washed and concentrated, with an average daily production of 48 tons of 8% concentrates. The smelter has two 30-ton 30x60" water-jacket blast furnaces, yielding 45% matte with 0.4% slags. Fines are briquetted, then roasted with lump ores in open stalls and roasted ores are smelted in the blast furnaces. Production of the Furokura was 746,605 lbs. fine copper in 1906; 1,021,314 lbs. in 1907, and 1,283,253 lbs. in 1908, gradually increasing in recent years to 4,003,924 lbs. in 1911 and 3,451,850 lbs. in 1912.

The Mizusawa mine, at Waka-gori, Iwate-ken, Rikuchu, area about 1,000 acres, was discovered A. D. 1717, opened 1737, and purchased 1891 by I. Furukawa. The property has two 3' veins at the junction of granite and liparite, carrying mainly chalcopyrite, with occasional galena and sphalerite, associated with pyrite, with scanty quartz gangue. The ores carry no appreciable gold or silver values. The mine is opened by 2 tunnels, the 1,400' main transportation tunnel being on the 6th level. The mine and works have a 282-h. p. plant and employ an average of 700 persons.

The Mizusawa reduction plant includes a small mill, turning out 10% silicious concentrates, and a small smelter having a 25-ton 23x66" rec-

tangular water-jacket blast furnace, making 40% matte, which is refined in Mabuki hearths. Production has increased from 477,415 lbs. fine copper in 1906 to 820,470 lbs. copper in 1911 and 744,228 lbs. in 1912.

The Nagamatsu mine, at Nishimurayama, Uzen, 1,000 acres, was discovered during the latter half of the seventeenth century. The property shows Tertiary tuff and shale, traversed by andesite dikes, carrying numerous veins, mainly parallel, with nearly north-south strike, and steep dip to the east. The Okubi, which is the main vein, has an average width of 6 to 12" only, with maximum of 24", carrying mainly chalcopyrite and occasional sphalerite and galena, associated with pyrite, in a scanty quartz gangue, with occasional barite. Development is by 2 tunnels, longest 5,000'. The mine has only a 20-h. p. power plant and employs an average of 700 men.

The Nagamatsu reduction plant includes a very small mill, yielding 7 tons of 12.4% copper concentrates daily, and a small old smelter. Ore is roasted in open stalls, smelted to matte in Japanese hearths, and blown to blister copper with blast from a No. 4 Connorsville blower, in the same hearth. The hearths take 5,000-lb. charges of roasted ores, requiring 1,500 lbs. of charcoal for each charge, with 10 hours for smelting, yielding 35% matte, which is roasted in stalls and resmelted to 60% matte, which is again roasted and smelted to blister copper of 97% average tenor in Mabuki hearths. Production but 610,590 lbs. fine copper and 12,203 oz. silver in 1907, increased to 908,926 lbs. copper in 1911 and 1,237,009 lbs. in 1912.

The Kune mine, at Sakuma-mura, Iwate-gori, Shizuoka-ken, Totomi, with an area of upwards of 3,000 acres, was opened A. D. 1731, and was mainly idle until 1897, when taken over by I. Furukawa. The property shows graphitic and chloritic schists, probably of the Algonkian series, with 3 horizons of ore beds, faulted by 2 synclinal step faults and one diagonal fault. The upper or Okuhi bed is the strongest, being 45 to 100' wide, 1,500' long and opened to depth of about 1,000'. The middle bed is about 12' wide and the lowest bed, of about 6' average width, splits into 2 seams at the bottom. Ore is mainly chalcopyrite, associated with pyrite, with compact granular texture and occasional magnetite, with rather scanty quartz gangue. Richer portions of the veins range 6 to 7% in copper tenor, with a range of 3 to 8% for the entire mine. The mine has 1 shaft and 2 tunnels, a 2,000' tunnel having double tracks, with 9 levels opened. Ore is mined by overhand stoping and the mine is timbered with square sets. The Kune has no power plant and no reduction works, shipping selected ore for smelting, but has a small leaching plant yielding about 60 tons of 50% precipitate yearly. An aerial tram leads from the spalling house to bins on the river Tenryu, where ore is loaded on boats and carried to the government railway. Production was 1,250,000 lbs. in 1907, and 1,300,000 lbs. fine copper in 1908. Recent production not separately reported.

The Otori mine, at the village of Oizuma, Higashi-Tagawa district, province of Uzen, bought 1895, has an area of 100 acres and forces, 1907, averaged 635 hands. The mine has a main vein of 1 to 6' width, and about 2,500' length, carrying chalcopyrite, with small quantities of tin, arsenic, antimony and bismuth, associated with pyrite, in a quartz gangue. Development is by a 1,600' main tunnel. A small smelter uses Mabuki hearths, on the same plan as the Nagamatsu smelter. Production was 264,526 lbs. fine copper and 8,067 oz. silver in 1907; 355,125 lbs. copper and 10,000 oz. silver in 1908, and has remained constant, being but 377,202 lbs. copper in 1911 and 411,203 lbs. in 1912.

The Innai mine is at Okachi, in Ugo province. This mine, with an area of about 1,500 acres, was discovered A. D. 1696, and became important about the beginning of the nineteenth century, silver production rising,

about 1840, to about 100,000 momme monthly, and was purchased, 1882, by I. Furukawa. The property shows augite-andesite and propylite, having numerous veins of 2 to 20' width, the main vein carrying chalcopyrite, pyrrargyrite, argentite and stephanite, with quartz gangue. A second vein, of 1 to 4' width, carries similar ores and in addition galena, sphalerite and pyrite, while a third vein carries chalcopyrite, galena and sphalerite only. Equipment includes a 500-h. p. hydro-electric plant, and a stamp mill. Production was 573,692 lbs. fine copper, 145,791 oz. silver and 1,603 oz. gold in 1907, and 338,820 lbs. copper, 95,942 oz. silver and 980 oz. gold in 1908, but is not separately given for recent years.

The Hirotani mine at Nishikawa-mura, Niigata-ken, Echigo, has only a 45-h. p. installation. Ore carries no appreciable gold or silver values. Production was 237,587 lbs. fine copper in 1907, and 137,053 lbs. in 1908.

The Nikko copper works, at Kamitsuga-gori, Tochigi-ken, Shimotsuke, were built, 1905, to refine the copper from the Ashio mine of the Furukawa Copper Co., and absorbed the Honjyo works, at Yanagiwaramachi, Honjyoku, Tokyo, in 1908. The smelter has 4 reverberatory furnaces, 2 with casting machines, 1 furnace being for refining blister copper not containing appreciable gold and silver values, and 1 for casting anodes. Blister copper before refining has the high average copper tenor of about 99.7%. The electrolytic refinery, of about 8,000,000 lbs. yearly capacity, uses the series system. There is an extensive wire mill, having a Bates & Peard annealing furnace, and 8 continuous drawing machines, with many single drawing blocks. Yearly production of the Nikko works is about 5,000 tons of copper wire, 2,000 tons of copper ingots, and 500,000 oz. refined silver and gold.

The management of the Furukawa Mining Co. is skilful and highly progressive. The responsible heads of departments are encouraged to travel, at the company's expense, through the principal mining and metallurgical centers of Europe and America, thus keeping the company fully abreast of international progress in every branch of its business. Recent production has been as follows: 21,599,300 lbs. fine copper in 1904; 23,780,573 lbs. in 1905; about 22,000,000 lbs. in 1906; 20,303,378 lbs. in 1907; 17,500,000 lbs. in 1908; 19,000,000 lbs. in 1909, and about 40,000,000 lbs. in 1912.

GADITANA DE MINAS; COMPANIA.

SPAIN

Office: Cadiz, Spain. Mine: Aznalcóllar, Sevilla, Spain. Capitalization 3,000,000 pesetas, shares 500 pesetas par; debentures, 2,000,000 pesetas authorized. Marquis de Fiel Pérez Calixto, pres.; D. José Luis Lacave, treas.; D. Salvador Viniegra, sec. Property is La Caridad group of mines, carrying large bodies of cupriferous pyrites, with considerable development. Company owns a 34-kilometer railroad, from Aznalcóllar to the Guadalquivir river. Property considered promising.

GALIZURSKI WORKS.

RUSSIA

Mine office: Galizursk, Zangezhur, Elizabethpol, Russia. S. Varavov, owner. This mine, in the Trans-Caucasus, has been worked intermittently since very ancient times, is on the Galisur Tschai, a tributary of and about 15 miles north of the river Arax, which is the boundary line between Russia and Persia. Ore occurs in a number of veins with prominent outcrops and traversing diabase and andesite, much crushed and silicified, and occasionally faulted. Veins are 3" to 3' in width, with nearly vertical dip, carrying sphalerite in the upper workings, which disappears in depth, ores including bornite and covellite in the secondary zone and chalcopyrite at depth. The average mineralized portion of the veins is about 8", carrying ore of about 15% average copper tenor.

The mine is developed to a depth of about 350', by 2 shafts and a tun-

nel, the opening called a tunnel being a combination tunnel, shaft, winze and stope, exceedingly erratic in direction and dip, having occasional staircases, and at times being carried through old stopes on bridges or notched timbers. Formerly ore was carried to surface in baskets and water in leather bags, but steam pumps were installed, only to be abandoned, owing to the cost of fuel, and are to be replaced by electric pumps.

Ore is hand-picked, high-grade ore, of 15 to 22% copper tenor, being sent to the smelter and middlings hand-dressed in sluice boxes by boys, to a concentrate of 15% copper tenor, balance of ore going to the waste dump. The smelter is but a little more modern than the mine. Maximum production was 1,308,796 lbs. fine copper in 1899, and recent production has been 100,000 lbs. fine copper in 1905; 45,000 lbs. in 1906; 65,000 lbs. in 1907 and 528,044 lbs. in 1908.

GALLO HERMANOS.

PERU

At Cerro de Pasco, Junín, Peru. Property is El Carmen smelter, having a 6-ton matting furnace, doing a small local custom business, at last accounts.

GATICO; COMPANIA DE MINAS DE COBRE DE.

CHILE

Office: Calle San Agustín No. 9, Valparaíso, Chile. Mine office: Gatico, Province of Antofagasta, Chile. Guillermo Rivera, pres.; Karl Huttman, vice-pres.; Charles W. Evans, Adolf Walbaum and Luis Claro Solar, directors; Arturo Frontaur, sec.-treas. and gen. mgr. of company; Geo. D. Waters, gen. mines mgr.; Frank D. Aller, gen. smelter mgr.; Daniel Carrazana and Celedonio Zuniga, mine supts.; Ernesto Rojas, chemist-assayer; Victor Medina Mesa, purch. agt.; Julio Arnado, mg. engr. Organized June 14, 1911, under laws of Chile, capitalization £275,000, shares £1 par; fully paid and issued. Dividend paid April, 1913, 5d. per share, another of same amount to be paid shortly. Shares listed on Santiago and Valparaíso exchanges. Net profits, 5½ months, 1911, were \$181,773.17; in 1912, \$511,459.90 pesos of 10d. each.

Property consists of the Toldo and Michilla groups aggregating 125 claims, 453 hectares, including 4 principal developed mines, also a 15-hectare smelter site, all in the Gatico district in the vicinity of the sea.

The claims held under government concession, include 2 groups of prime importance, 1 being the Mina Toldo, at Gatico, and the other the Michilla group. Other properties of importance or promise are the Vellarde, Crimea, Argentina, Santo Domingo, Carolina and California mines. Properties as a whole carry 14 veins of importance, with 8 under development. Management estimates that the mines as a whole average about 8% copper, 0.2 oz. silver and one-half gram gold per metric ton, ores being mainly chalcopryrite, with some bornite. Mines as a whole have 11,128 meters of workings with 45,000 metric tons of ore blocked out for stoping. The principal mines were opened, 1830, closed, 1861, and reopened, 1887.

The Toldo mine, at Gatico, 4 kilometers northeast of the smelter, on the first mountain range overlooking the sea, is favorably situated for economical operations on a considerable scale. Country rock is syenite, carrying a fissure vein of about 3' average width, with nearly vertical dip, ore occurring in strong shoots, of great persistence, with cross veins causing increase of mineralization at points of intersection. Ore is a chalcopryrite and bornite with \$1 in gold per ton and a trace of silver. The ore is entirely free from zinc, lead, antimony and barite, with gangue mainly of quartz and a little feldspar. The zone of oxidation, about 100 meters in depth, is succeeded by a secondary zone carrying silicates, brochantite and a little native copper, but with no secondary sulphides, the secondary

zone being succeeded directly by chalcopyrite, associated with a little pyrite. The Toldo mine has 3 shafts, 340 meters from one another, deepest 1,400', with 16 levels opened at approximately 25-meter distances. The mine is opened for a length of 1,500 meters, including the workings on the 574' Velarde shaft, which mine is an extension. The mine requires very little timbering and water appears in small quantities at depth of 125 meters. Total workings, 40,000'. The Toldo and Velarde mines are estimated to have in sight better than 51,000 metric tons of ore, averaging above 8% copper, and employ 235 men, miners working 8-hour shifts, on contract, producing an average of 800 kgs. ore per man per shift, with average daily earnings of 7 pesos, which is good work and high pay.

Equipment at the Toldo mine includes a 75-kw. hoist at the main shaft, good for 800 meters depth, raising 1,100-kg. cages at a velocity of 600 meters per minute. There is a Rand air compressor, driven by a 60-kw. motor, and the mine uses air-hammer power drills, and is experimenting with Murphy and Holman stope drills. El Toldo mine is connected with the smelter by a 3,644-meter Ropeways aerial tram, having 19 towers, highest 20 meters, with longest span of 433 meters and drop of 372 meters, carrying 160-kg. buckets, with hourly capacity of 5 metric tons, operated by electric power, assisted by gravity. Cables last from 2 to 3 years, and cost of transportation is only about 1 peso per metric ton, one-half being for upkeep.

The Michilla group includes the California, Carolina and Eduardo mines, at an elevation of 1,000 meters above sea-level, 6 kilometers east of Michilla cove, and 15.6 miles south from Gatico. Lodes of this group are flat bedded veins in andesite porphyry, the dip averaging 30'. They vary greatly in width, ranging 1 to 15 meters across, carrying ore in bunches. The vein of the California mine, of about 5 meters average width, yields ore that, with selection, averages about 5% copper, this mine having a 20-meter vertical shaft. La Carolina mine is opened to depth of only 80 meters, with horizontal length of 300 meters, workings being entirely in oxidized ores. La Carolina has oxide, sulphate, silicate and oxychloride ores, all soluble in weak acids, gangue being porphyritic and insoluble. The greatest part of the ore is brochantite with smaller quantities of atacamite, chrysocolla and copper oxides. The mine requires no timbering, and this and the adjoining mines of the Michilla group show about 80,000 metric tons of 5% ore, all ore under 4% tenor being discarded. Production, 1912, was about 775 metric tons monthly of ore averaging 5.63% copper.

The Michilla mines have a 5,331-meter Bleichert aerial tram to Michilla Cove, with 50 towers, highest 25 meters, longest span being 359 meters. The line carries 300-kg. buckets and has an hourly capacity of 20 metric tons. There are 2 intermediate tension stations and, by reason of the heavy drop of 929 meters, or nearly 1 in 5, about 50-kw. in electric power is generated automatically, with a hydraulic regulator, only 5 operatives being required for the line. The tram, in commission 1908, cost about £11,000 in Europe, and approximately £20,000 installed. Ore is shipped from Michilla Cove to Gatico by lighters.

The smelter, at the port of Gatico, 30 miles south of Tocopilla, and 60 miles north of Antofagasta, has two 38x140" blast furnaces, 1 held as a spare, using sea water for jacket and burning Westphalian coke, costing 30 to 65 pesos per metric ton. A nearby limestone quarry provides flux brought in wagons. Mineral charges are about 40% lump sulphides, 30% briquetted sulphides from the Toldo and 30% oxidized ores from La Michilla, to which are added 30 parts of flux and 30 parts of slag for remelting, a total of 160 parts, requiring 17 parts of coke for smelting.

Product is a matte of 45% average copper tenor, carried in metal launders to the converters. Slags, assaying 0.35 to 0.5% copper, are dumped into the sea, granulation not being practicable.

The converter department has 4 stands with eight 57x81" barrel-type shells, built in the shops. Shells are rotated by hand, but there is a hydraulic accumulator for later installation. Converter product is Chile bars averaging about 98.9% copper, 2.6 oz. silver and 0.7 oz. gold per ton, shipped to England for electrolytic refining.

The briquetting plant, with a Chisholm, Boyd & White press, takes fines from the Toldo ores, and flue dust, using distilled sea water, briquettes going to the blast furnaces. There is a small experimental leaching plant treating La Carolina ores and consideration has been given to adding an acid plant to provide leaching material.

The power plant includes three 200-h. p. Babcock & Willcox boilers, a 200-h. p. electric motor-generator set, a 120-h. p. Allis-Chalmers duplex air compressor for the converters, a Connersville blower direct-connected to a 60-h. p. Erie Iron Works engine, for the blast furnaces, and a 120-h. p. Williams-Foster engine in reserve. There also are minor engines for the briquetting plant, machine shop and electric light. Australian coal costing 30 to 50 pesos per ton is used.

Owing to the aridity of the district it was necessary to solve the water question by a distillation plant, furnished by the Mirrielees-Watson Co., Ltd., which has a capacity of 140 metric tons of distilled water daily. There are 2 pumps of 60 metric tons capacity hourly. Sea water is used for condensing steam, after which it passes through the water jackets of the blast furnaces. The water plant includes a reservoir of 50 cubic meters capacity.

The shops are very complete, being capable of repairing and, if necessary, replacing all machinery parts at the mines and smelter. Shops include an iron foundry, pattern shop, carpenter shop, boiler shop and a small brass foundry, and there also is a complete chemical laboratory.

Transportation facilities include 3 piers, and a 38-ton tug makes daily round trips between Michilla Cove and Gatico, towing four 30-ton ore lighters. A 1,600-meter private railway, with 2 locomotives and 25 cars, connects the smelter and wharves. The company maintains a physician for employees and their families, and 3 schools.

Production has been as follows: 3,127,512 lbs. fine copper in 1907; 3,450,810 lbs. in 1908; 4,097,095 lbs. in 1909; 4,047,104 lbs. in 1910; 4,116,298 lbs. in 1911 and 3,871,438 lbs. in 1912, decrease due to cloudburst and floods at Toldo. Estimated output for 1913, 4,365,000 lbs. The property is considered valuable, and the company is progressive and well-managed.

GEISSE; SUCESIÓN FRANCISCO

CHILE

Idle. Mine at El Espino, Combarbalá, Coquimbo, Chile. Property includes El Espino mine, opened 1896, which produced about 100,000 lbs. fine copper yearly when working, and the Fundición El Pupio, a small smelter.

GEISSE HERMANOS.

CHILE

Mine at Illapel, Coquimbo, Chile. Works office: Tocopilla, Coquimbo, Chile. Property includes the Bella Vista, Las Trabos and Tongoi mines. The Bella Vista mine is about 150 meters deep, with workings for about 150 meters in horizontal length. The Tongoi mine, at Mineral de Tongoi, Illapel, has a vein of 2 to 3 meters width, opened to depth of 160 meters and, 1903, employing 90 men, produced 900 metric tons of ore, averaging 9% copper and 25 grams gold per ton. Los Trabos mine in the same year produced 720 metric tons of ore of 20% copper tenor.

Property includes the Fundición de Illapel, producing only 23,734 lbs. fine copper in 1908 and 42,030 lbs. in 1909, but 1,746,164 lbs. copper in pigs

of 50% matte and 86,587 lbs. copper in bar copper, 97% fine was produced, 1910; also the Fundición de Porvenir, at Tocopilla, which has a blast furnace, and several reverberatories of about 30 to 40 tons capacity each. This smelter is said to have worked under some difficulties latterly. Production is matte of about 50% copper tenor, and Chile bars averaging 97% copper, with considerable silver and gold values, exported for refining and parting the precious metals. Production was 523,974 lbs. fine copper in 1908 and 426,288 lbs. in 1909.

GERALDINE COPPER & LEAD MINES, LTD.

ENGLAND

Manager and offices: J. Sullivan, 18 Ironmonger Lane, London, E. C. England. Organized Oct., 1912, capitalization £60,000, shares 10s. par. Company formed to acquire and deal with mining properties.

GERTRUDIS; MINA.

PERU

Owned by the Morococha Mining Co., which see.

GIPPSLAND COPPER, PLATINUM & GOLD MG. CO. TASMANIA

Office: 60 Queen St., Melbourne, N. S. W., Australia. H. B. Black, chairman; P. E. Käpel and Dr. H. Friedman, directors. Organized under laws of Victoria, 1911, succeeding a company of same name formed in Tasmania. Capital £16,250, shares 5s. par. Report of Sept., 1912, showed liabilities, £6,273; liquid assets, £1,682. Government assistance of £1,500 was asked in March, 1913.

Property consists of claims on Cooper's creek, near Thomson river, close to Walhalla, Tasmania. Ore deposit is a hornblende diorite dike in sedimentary slates and quartzites carrying chalcopyrite mixed with hornblende in bunches and streaks. Mine 300' deep with reserves estimated, 1911, at 76,000 tons, carrying 4% copper and 5 dwt. platinum. Deposit was drilled by government some years ago, a 37° hole showing 102' of ore. Property has 60-ton smelter and 1½-mile tram to Moe-Walhalla railway. Production, 1911, 700 tons yielding 43½ tons matte, worth £22 13s. per ton and carrying 38.7% copper, 7.464 oz. silver, 0.645 oz. gold and 1 oz. 16¾ dwt. platinum.

Property was boomed and shares sold as high as 16s. but manager now reports that ore cannot be profitably smelted without 15s. iron ore. Company also owns the Happy-Go-Lucky gold mine 3 miles from its copper property which is also a failure. Receivership seems likely.

GIRILAMBONE COPPER MNG. CO., LTD. NEW SOUTH WALES

Idle. Office: Sydney, N. S. W., Australia. Mine office: Girilambone, Canbelego Co., N. S. W., Australia. G. A. Richards, mgr.; W. Blakemore, mine mgr., at last accounts. Was organized under this title, reconstructed, Feb., 1902, under title of Girilambone Copper Mining Co., N. L., and reorganized, 1907, under the original title. Debentures, £12,400. While company is not officially in liquidation, the mine is at the mercy of debenture holders as no interest has been paid for 3 or 4 years. Being a no liability company, liquidation proceedings can only be started by the action of some creditor.

The mine, opened 1880, carries numerous quartz veins and intrusions, ore occurring mainly as disseminations and replacements, lacking clearly-defined walls, in arenaceous slate and sandstone having occasional hard bands of quartzite, ore being mainly sulphide, with quartz gangue, though the mine carries considerable carbonate ore of high grade, in the oxidized zone, of about 200' depth. Main shaft is 544'. Ores are divided into 3 classes for treatment, the first comprising carbonates and cuprite of about 4.6% average tenor, second class ore being composed of oxides from the transition zone, while sulphides from the lower workings constitute the

third class, each being smelted separately. Average of all grades, 1900, was 3.85% copper.

The smelter has 2 reverberatory furnaces and a refining furnace, turning out blister copper of the remarkable purity of 99.95%. Ores are difficult of reduction owing to their deficiency in sulphur and iron and excess of silica. Water is very scarce, the property having a dam and filtering and reusing the water repeatedly. The reduction plant includes lixiviation works, where tailings and certain low-grade oxidized ores are leached. Magnetic separation was tried in 1901.

The property was reopened, 1906, employing 60 men, and smelted 6,035 long tons of ore, yielding 293,440 lbs. fine copper. No work has been done since 1909.

GLADSTONE MINE.

NEW SOUTH WALES

Wrightville, Robinson Co., N. S. W., Australia. Lands, 2 miles south of the Great Cobar mine. Described Vol. X. Probably idle. No returns secured.

GLAMORGAN COPPER OPTIONS SYN.

NEW SOUTH WALES

Organized, 1912, in Sydney, N. S. W., Australia, capitalization £10,000, shares £10 par. F. G. Parish, H. Richardson and A. E. Ellis, directors. Property at Gordon Brook, Clarence river, N. S. W., developed by several shafts of 50 to 100' depth, said to expose promising orebodies.

GLASSFORD CREEK MINE.

QUEENSLAND

Mine office: Glassford Creek, Curtis Co., Queensland, Australia. W. C. Willcocks and Jas. Stewart, leasers. Lands, leasehold, include the Blue Bag mine, discovered 1897, in the Dawes range. Nearest rail point is Gladstone, 35 miles north. Mine was developed opencast, but this system was abandoned, 1907, for underground workings, by tunnel and a 75' shaft. Mine has a contact vein of 30 to 100' width, with slate foot and granite hanging, carrying sulphide ores. Mine idle, 1912, due to lack of capital and Blue Bag workings flooded.

The reduction plant includes a 300-ton Blake-Marsden crusher and picking tables. The smelter, near the mine, has a small reverberatory furnace and a 100-ton rectangular blast furnace, installed 1906, with a Connersville blower, making matte of 40 to 45% copper tenor, with slags averaging 0.3%. Production, under old ownership, secured with an average force of 183 men, was 913,366 lbs. fine copper, 13,699 oz. silver and 4,715 oz. gold in 1906, and was 787 long tons of ore, yielding 223,200 lbs. fine copper, 3,576 oz. silver and 653 oz. gold in 1907, giving an average extraction of about 2% copper, 0.75 oz. silver and 2.75 dwts. gold per ton. Production was suspended October, 1907, and the old company liquidated, property passing into the hands of present leasers, on the basis of their assumption of both assets and liabilities, latter about £30,000.

GLORIA DEL INCA; COMPAÑIA MINERA.

CHILE

Idle. Mine near Chañaral, Atacama, Chile, and Copiapó, Atacama, Chile. Organized Oct. 25, 1906, under laws of Chile, capitalization £20,000, later increased to £30,000. Property is 3 groups of mines, 2 in the Mineral del Inca district, and 1 in the Mineral del Chivato district.

The Fortuna group, 8 claims, 12 kilometers from San Pedro Nolasco, on the Chañaral railway, at an elevation of 2,000 meters above sea level, shows porphyry, with andesite dikes, developed by the Fortuna tunnel, driven by former owners, and carries 2 practically parallel veins, known as the Fortuna and Fortunita, latter being crossed by the Crucero vein. The Tres Puntas group includes the Dos Hermanos mine and the Sierra del Chivato group, of 7½ acres, south of Estación Angostura, on the Chañaral railway.

GLÜCKAUF-NEVIGES; GEWERKSCHAFT VEREIN. GERMANY

Mine at Neviges, Rheinprovinz, Prussia, Germany. Chr. Weuste, L. Kannengeiser, G. Engels, Herman Heymann and Herr Tilmann, directors; Julius Leverkus, mgr. Organized under laws of Germany, capitalization 1,000 shares, without assigned value.

Mines carry lead and copper ores, developed by 2 shafts, and produce 17,000 metric tons of ore yearly, with values mainly in lead. The mines have a small concentrator producing about 12,000 tons crude ore yearly at last accounts.

GOLDBACH; GEWERKSCHAFT.**GERMANY**

Idle. Office: Oberrossbach, Nassau, Germany. Mine at Siegen, Westfalen, Germany. Ernest Giebler, gen. mgr.; Herr Bluner, supt., at last accounts. Organized 1898, under laws of Prussia, capitalization 100 shares, without assigned value. Mine, near Haiger, developed by tunnels, has about 450 meters of workings, on a 30" vein carrying chalcopryrite giving assays of 20 to 30% copper.

GOLONDRINAS; MINA DE.**BOLIVIA**

Idle. Owned by Sr. Pedro Bogge. Property in Callapa Canton, Province of Pacajes, Bolivia, 80 hectares, carrying 2 copper-bearing veins 25 to 36" wide, averaging 75% copper. Developed by shaft.

GOMEI-KWAISHA FUJITAGUMI.**JAPAN**

Is the Japanese title for the Fujita Co. owning the Kosaka and other mines, described under Fujita Co.

GONZALEZ; SUCESSION P.**CHILE**

Idle. Works at Labrar, Freirina, Atacama, Chile. Property is a matting furnace built 1900, which formerly produced 1,250,000 lbs. fine copper yearly.

GOODRICH PROPRIETARY.**NEW SOUTH WALES**

Idle. Mine office: Yeoval, Gordon Co., N. S. W., Australia. F. Pearce, mgr., at last accounts. Mine, 5 miles from Yeoval, known, at various times in the past, as the Buckenbar, Gordon and Yeoval, was opened 1868, and first worked for gold, but gold being succeeded, at depth of only 30' by chalcopryrite, the property was worked as a copper mine for several years and had a smelter, said to have produced about 225,000 lbs. fine copper and 130 oz. gold per month. Later the mine was worked again for gold only, and, 1886, had a 20-stamp battery. Mine was reopened 1898 and taken over, 1903, by the present company.

The mine has a quartz vein in granite, of 4 to 8' width, carrying a little malachite and magnetite near surface, succeeded by auriferous and argentiferous chalcopryrite, associated with magnetite, and also has a pipe-vein, about 300' in diameter, showing ore assaying up to 18% copper and 4 oz. gold per long ton. Development is by a large open pit and a 300' shaft. Underground workings have given much trouble in the past from caving. Mine is said to have about 20,000 tons of strongly auriferous copper ore in sight. No recent returns secured.

"GOROB"; DEUTSCH S. W. AFRIKANISCHE**KUPFERMINENGESELLSCHAFT.****GERMAN S. W. AFRICA**

Idle. Office: Berlin, Germany. Mine office: Gorob, German S. W. Africa. Max Schöller, chairman; preceding officer, Max Müller, Herr Hanemann, Herr Walther, Herr Steinweg, Herr Mohr, Albert Weil and Otto Erhard, directors; Herr Huser and Herr Etting, mine mgrs. Organized under laws of Germany, capitalization 400,000 marks, shares 100 marks par. Development consists of 1 shaft, of 50 meters depth. No recent returns secured.

GOSSAN MINE.**QUEENSLAND**

Owned by Carmen & Sons. Has opened up a substantial width of profitable ore in tunnel, March, 1913.

GOULMA COPPER OPTIONS CO.**NEW SOUTH WALES**

Organized in Sydney, N. S. W., in 1912, capitalization £5,000, shares £10 par.

GRAFTON COPPER MNG. CO., LTD.**NEW SOUTH WALES**

Secretary's address: P. O. Box 3, Grafton, N. S. W., Australia. Mine office: Cangai, Drake Co., N. S. W., Australia. Samuel See, chairman; Peter Kritsch, managing director; preceding officers, Wm. Zietsch and Geo. Henry Varley, directors; Wm. McNeill, sec.; Jas. Newton, underground mgr.; Wm. Hughes, smelter foreman; Geo. H. Blakemore, cons. engr., at last accounts. Organized Jan. 29, 1906, under laws of New South Wales, capitalization £80,000, shares £1 par; fully issued and fully paid. Dividends were £11,000 in 1907; £4,000 in 1909, and £5,000 in 1910, a total of £20,000. Net earnings were £6,080 in 1909. Shares are listed on the Sydney Stock Exchange. Annual meeting, last Tuesday in January.

Lands, 7 claims, leasehold, with 10-acre mill and smelter site, 26 miles by bullock tram to Copmanhurst, with water transportation from that point. Property carries 4 fissure veins, in felsitic tuffs, of which 3, under development, are estimated by management to average 10' width and 400' in proven length. The main vein has an ore channel, with nearly vertical dip, carrying shoots, 1 to 13' wide, of chalcopryite, with a little malachite and azurite in the upper workings, ore averaging about 10% copper, 0.58 oz. silver and 18 grains gold per long ton. The South Lode, of 3 to 10' average width, carries up to 6' of massive chalcopryite. The mine, opened 1905, has several shallow shafts, but development is mainly by tunnels; A, 1,305', showing 15.6% copper ore, full width of working; 5 other tunnels are also driven with a total of about 4,500' of workings. Ore blocked out Dec. 31, 1911, 19,000 tons averaging 10% copper. All mining is done by hand-work. Ore is taken by gravity trams from the mouth of the main tunnel to ore-bins and thence by carts to the smelter. Produced, 1911, 8,170 tons of ore carrying 10.3% copper. Development for year 1911, 1,474'. Mining and development costs £1 2s. 2d.

The 60-ton smelter, $1\frac{1}{4}$ miles from the mine, has four 15-ton reverberatory furnaces and began smelting May, 1906. Sulphide ore is roasted in heaps of 100 to 200 tons, requiring 6 to 8 weeks, according to size. Smelter produces first matte about 30%, roasted and resmelted to 63%; matte averaging about 63% copper, 5 oz. silver and 4.5 dwts. gold per ton, sold in Sydney, for export to Germany. Fuel is wood, costing 15s. per cord, with a yearly consumption of about 10,000 cords, and the supply is somewhat uncertain, with a precarious water supply also. Company plans a 4-mile fuel tramway at a cost of about £8,000.

Production was 790,840 lbs. fine copper in 1907; 1,149,120 lbs. copper, 3,994 oz. silver and 249 oz. gold in 1908; 1,630,720 lbs. copper, 7,058 oz. silver and 352 oz. gold in 1909; 1,836,800 lbs. copper in 1910; 1,609,548 lbs. copper, 217.7 oz. gold and 5,002,272 oz. silver in 1911. Property considered valuable and management good.

GRASLITZER KUPFERBERGBAU.**AUSTRIA**

Idle. Mine at Eilenberg, Bohemia, Austria. Mines, which are very ancient, and were one of the principal sources of European copper supply during the Middle Ages, show a vein of 12 to 15' width, in clay-slate. Mines were reopened, on a considerable scale and a new smelter built, 1901.

GREAT AUSTRALIAN FREEHOLD COPPER CO. QUEENSLAND

Address: Cloncurry, Queensland, Australia. Company has closed down

property after an expenditure of £137,000 because of a royalty of 5% of the value of the ore broken and a second royalty of 5% of the value of the copper produced, which makes it impossible to work the property at a profit. Government officials are seeking some means of compelling the freehold owners to reduce the royalty in order that the mine may be worked, the property being considered a valuable one.

GREAT AUSTRALIAN MINE.

QUEENSLAND

Owned by Queensland Exploration Co., Ltd.

GREAT CARPENTARIA COPPER

MINING CO.

NORTHERN TERRITORY

Address: Maude via Katherine, Northern Territory, Australia. Mr. Brooks, mgr. Company owns several claims near the above address on which 4 large outcrops show copper carbonate ore. There are 2 main veins traceable for one-half mile, and varying up to 200' in width. The property was producing high-grade oxidized ore in 1912 and prospecting disclosed massive bodies of copper pyrite and gray copper. The federal government made a grant of £2,500 on the usual terms that the company should spend an equal amount in deep development.

On the south lease a 100' vertical shaft will be sunk with a crosscut and on the north lease a 200' tunnel will be driven to cut the 8' vein shown on the surface. The ore carries from 6 to 40% copper and up to 7 dwt. gold per ton.

GREAT COBAR, LTD.

NEW SOUTH WALES

Office: 65 Broad St., London, E. C., England. Mine office: Cobar, Robinson Co., N. S. W., Australia. Works office: Lithgow, Cook Co., N. S. W., Australia. Andrew Haes, chairman; R. H. Henning, F. A. Robinson, Gerard B. Elkington, J. P., G. E. Baker, W. Pellew-Harvey, W. R. Stephenson and W. I. Barnett, directors; Alex. Johnston, sec.; H. C. Beljinger, gen. mgr.; Geo. A. Laird, gen. supt.; Nicholas Treloar, mine supt.; T. J. Murphy, smelter supt.; Percy Penman, mg. engr.; T. J. Thibault, chemist assayer; W. Mitchell, purch. agt.

Organized May 22, 1906, in Great Britain. Capitalization £1,000,000, shares £5 par; 186,542 issued and fully paid. Capital increased from £750,000 to £850,000 to acquire Cobar Mines, Ltd., July, 1910, and to present amount Oct., 1910. Debentures, £750,000, (£724,800 outstanding) first-mortgage 6% bonds, in denominations of £20, £50 and £100, redeemable by drawings at 5% premium, but repurchasable by means of a sinking fund, created 1908, by setting aside £100,000 annually, from profits. Paid a 15% dividend, of £112,500, Sept. 16, 1907.

Gross profits for the year ending June 30, 1912, were £168,691; out of this the directors wrote off £23,941 for depreciation, £15,338 from development, £8,407 from shafts and £43,161 from the underwriting and organization account, once £181,264, now reduced to £50,000 and since entirely wiped out. Balance carried forward £34,356.

Ore reserves June 30, 1912, were 2,777,610 tons, being 1,813,087 tons of 2.6% copper ore in the Great Cobar mine, 662,349 tons of 2.6% copper ore in the Chesney mine and 302,174 tons in the Cobar gold mine. Property examined and favorably reported upon in 1912 by C. S. Herzig.

Company took over the property of the Great Cobar Mining Syndicate, 1906, for £1,006,000, of which £800,000 went to the owners, the promoters taking £206,000 in cash, shares and debentures. The property of the Cobar Gold Mines, Ltd., was bought, July, 1910, for £100,000.

Lands, 3,575 acres, of which 1,323 acres are freehold, including the Great Cobar mine, area 208 acres, leasehold; the Cobar gold mine, area 108

acres, leasehold; the Cobar Chesney mine, area 198 acres, half freehold and half leasehold; the Great Peak and Conqueror gold mines, at Cobar; the Rix's Creek Colliery and coke works, at Singleton, and smelting and refining plants at Cobar and Lithgow.

The Great Cobar mine, the most important copper producer of New South Wales, was opened in 1869, and closed down in 1892, failing to smelt sulphides in a reverberatory furnace. Production, 1869-1892, was 26,611 tons fine copper, made from rich oxides, ores averaging 11.07% in copper tenor and considerable dividends were paid therefrom. Mine was reopened, 1892, by tributors, on a 10-year lease and, at the close of 1902, had produced under their management, 730,669 tons of ore giving average returns of 3.27% copper. A long-standing dispute between the tributors and the fee-owners was settled, 1903, through the purchase of the property by the former, who sold to the present corporation.

Country rock, of Silurian slate, carries 3 veins of nearly vertical dip known variously as the East, Middle and West lodes, but only the West lode has been productive thus far. This vein varies from 6' to 52' in width and carries lenticular orebodies. One of the principal parallel mineral zones is basic and the other acid, these lying about one-half mile apart. The principal ore shoots are 28', 38' and 52' in extreme width, with lengths of 135', 345' and 485', proven to depth of 1,500'. The oxidized zone extends to an average depth of about 250' succeeded by rich chalcopryrite ore to a depth of 400'; below this the ore gradually becomes leaner. The copper occurs in chalcopryrite, associated with pyrite and magnetite, with occasional pyrrhotite, of about 3.5% average copper tenor in the Cobar and 2.81% in the Chesney carrying an average of 0.5 oz. silver and 1.5 dwts. gold per long ton. Ore is mined by overhand stoping, with 10' pillars left beside the shafts, and timbering is by "pigstye," or bulkhead system. Ore is first broken in immense masses, then reduced to smaller size by block-holes and pop-shots.

No. 1, the main shaft of the Great Cobar, is 16x8' in size, 1,540' deep, with bottom level at 1,520'. The Barton shaft is 1,060' in depth, and these shafts are connected on the 1,060' (or No. 10) level. The mine has upwards of 3 miles of workings and the orebody shows no sign of decreasing width or value at depth. Ore reserves were estimated, June 30, 1912, at 1,813,087 long tons, being 328,193 tons less than in 1911, largely the result of the adoption of a lower specific gravity factor in calculations, and offset by 350,000 tons of probable ore not figured in former calculations, averaging 2.6% copper. New levels are to be opened at 150' intervals and it is estimated that each level should develop about 600,000 tons of ore. No. 1, the main shaft, has 2 hoisting compartments, using cages and trucks, raised by a Corliss hoist. The headgear, 67' high, and shaft house are of structural steel, latter with brick walls. Buildings at the mine include a power house, boiler house, repair shops, machine shop, smithies, office and miscellaneous structures.

The Cobar Chesney mine, area 198 acres, half freehold and half leasehold, has a 900' shaft, and at depth of 460', shows a 40' vein, carrying 2.5 to 4% copper and 2.5 to 3 dwts. gold per ton. The mine has 700,000 long tons of 2.6% ore blocked out, furnishing 20 to 35% of the total ore production of the property. The Cobar Chesney was opened as a gold mine, the outcrop carrying no copper, but carbonate copper ore was found at depth of 155' and at 250' depth there was chalcopryrite, coated with what was termed melaconite, but which probably was chalcocite. The Cobar Chesney is worked in connection with the Great Cobar, and on the 464' level shows a lenticular ore shoot 25' wide and about 600' long that carries

chalcopyrite, with slate and quartz gangue. The Cobar Chesney has a 500-ton concentrator.

The Fort Bourke ore, richer in gold, has partly supplanted the Chesney as a source of silicious flux.

The Cobar Gold mine, often called the Fort Bourke, area 123 acres, leasehold, also has 50 acres of water rights, and a 50-acre mill site. Ore is sulphide, averaging 1.25 to 1.30% copper, and 10 to 11 dwts. gold per long ton, but carries much barite in the gangue, and the presence of copper renders cyaniding difficult for gold recovery, while the low percentage of copper renders direct smelting unprofitable for that metal. Ore reserves were estimated, June, 1912, at 300,000 tons of 1.5% copper, and nearly \$10 gold. The mine was idle from Sept., 1908, until taken over, July, 1910. The purchase of the Cobar gold mine was advantageous to both seller and purchaser.

The Peak and Conqueror gold mines are 6 miles from Cobar. The first named, a steady producer for 18 years, is now being developed. The ore is silicious and free from iron and sulphur and is a desirable flux for the basic ores of the Cobar group.

The mining plant, shops, smelter and yards of the Great Cobar cover a tract of about 80 acres. The entire works have been remodeled and brought up to date under the able management of Mr. H. C. Bellinger.

The mill of the Cobar gold mine has 100 stamps, a cyanide plant and slimes plant. An Elmore oil flotation plant, while technically successful did not give satisfactory work in connection with the old mill.

The mining plant includes a 500-h. p. first-motion hoist, good for 2,000' depth, at No. 1 shaft, and two 25-drill air compressors.

Electric power is used almost exclusively, upwards of 3,000 h. p. being required for the mine and works. The new power house, adjoining the smelter building, is exceptionally well designed and complete. The building is of steel, with brick walls. There are two 20-ton overhead traveling cranes, reaching the full length of the building. Electric power is furnished by three 300-kw. 3-phase 50-cycle 400-volt alternating current generators, mounted directly upon the shafts of 3 Corliss cross-compound condensing engines, of which 1 is a spare. There are two 250-kw. motor-generator sets, operated by current from the main generators, supplying direct current at 240 volts for the operation of the cranes, converter stands, and minor motors about the plant. There are two 2,500 cu. ft. air compressors, furnishing power for the rock drills and air hoists. Four Connorsville blowers, each direct-connected to a Corliss tandem-compound engine, furnish blast, at a pressure of about 45 oz., each blower being connected independently with its own blast furnace, a cross-connection header, with suitable valves, permitting blast from any blower to be directed to any furnace, or the pressure of all blast mains to be equalized. A Corliss duplex cross-compound air compressor, with capacity of 10,000 cu. ft. of free air per minute, at 15 lbs. terminal pressure, supplies air to the converters. All engines and blowers are set staggering. The boiler room has six 500-h. p. Babcock & Wilcox water-tube boilers, with self-contained superheaters, and Green fuel economizers, delivering steam at 170 lbs. throttle pressure. Boilers are charged by chain-grate stokers, taking coal from steel bins overhead, these having a pan-type conveyor running the full length of the boiler room, over the coal pockets, and outside of the boiler room, under a receiving hopper, into which coal is discharged from railroad cars. The same conveyor, upon its return, runs under the boiler room, and ashes from the grates are discharged into a steel hopper at one end of the building located over railroad tracks, and ashes are removed by rail.

The district being arid, dry seasons causing much trouble from lack of water, dams totalling 220,000,000 gals. capacity have been built, water cost averaging about 8s. per 1,000 gals.

The frame sampling mill, for custom ores, has 50 tons hourly capacity, taking every fifth car. Equipment includes a No. 5 and No. 3 gyratory crushers, 2 Heclon crushers, of 120 tons hourly capacity, 2 sets of 24x14" belt-driven rolls, and two 28" and one 42" Simplex automatic samplers, the final sample consisting of 1 part in 1,500. Ore from the sampler is delivered to electrically driven belt conveyors, leading to a 1,500-ton ore bin, whence ore is loaded into 30-ton cars, and drawn by electric locomotives to the main storage plant. New ore bins of 12,000 tons storage capacity were built 1910.

The new smelter, of upwards of 1,200 tons daily capacity, has cost about £150,000 complete. Equipment was furnished by the Power & Mining Machinery Co., and the design is good, but not well adapted to the work and nearly broke the company, until the appointment of Mr. Bellinger who brought order out of chaos. The furnace building, near the mine, has corrugated iron roof, but no steel walls. Ore is taken from 12,000-ton storage bins in hopper-bottom cars hauled by electric locomotives on tracks of standard gauge, charging being done from V-shape side-dumping cars running on 36" gauge tracks on either side of all furnaces at the charging-floor level. Slags are handled in 25-ton ladle cars, electrically dumped, with alternative hand-dumping, there being car tracks on either side of each settler. There are four 56x240" blast furnaces, each with 40 tuyeres, set end to end, 1 being held as a spare. There are four 18' circular steel settlers, 1 between each 2 furnaces and similar settlers at the outer ends of the 2 end furnaces, giving each blast furnace an alternative discharge at either end and also providing an extra settler in case of trouble. About 9% coke charges are used.

The reverberatory department is now dismantled. The converter department has two 40-ton electric traveling cranes, of 50' span, running the entire length of the smelter building. There are 3 stands, electrically rotated, having 84x126" shells of the Copper Queen barrel type. Silicious gold ores from the Cobar gold mine are now used, instead of barren quartz, for linings. Converter ingots are sent to American refineries.

The Lithgow refining works, 370 miles by rail from the mine, include an old smelter with five 110-ton water-jacket blast furnaces and reverberatories. The principal feature is a 672-tank electrolytic refinery, installed 1902, which also does a general custom business, having a daily capacity of about 25 tons of finished copper. Tanks are of 2" Oregon pine, lined with 6-lb. lead, and inner-lined with 1" redwood, all woodwork being boiled in paraffine for 1 hour without the use of pitch or bitumen. There are 7 depositing dynamos, 2 caring for 144 tanks each, and 3 caring for 128 tanks each, the tanks for each dynamo being arranged in 4 long rows, each row having 3 terraces and each terrace a separate feed of electrolyte, tanks being stepped down 3" to insure proper circulation. Electrolyte from the collecting sump is elevated by air-jet into the storage tanks for recirculation.

From 1876 to 1906, inclusive, the Great Cobar mine yielded 1,592,895 long tons of ore, returning 138,593,280 lbs. fine copper. Production, under the former ownership, was 7,000,000 to 9,000,000 lbs. copper yearly, having been 9,027,200 lbs. fine copper in 1906, and production by present company has been about 10,000,000 lbs. in 1907; 10,586,240 lbs. copper, 64,949 oz. silver and 13,002 oz. gold in 1908; 12,762,080 lbs. copper, 83,208 oz. silver and 14,452 oz. gold in 1909; 13,847,680 lbs. copper, 107,932 oz. silver and 21,524 oz. gold in 1910. Production for the year ending June 30, 1912, was 339,494

tons of ore from the company's own mines and 88,924 tons of custom ore, producing 15,089,760 lbs. copper, 178,938 oz. silver and 37,696 oz. gold.

Some serious mistakes were made in the earlier stages of this company's career and operations were so hampered, 1909-10, by the New South Wales coal strike, that the property was idle from Nov. 4 until the end of 1910. Despite the initial mistakes the company now seems in a safe position and should soon have a productive capacity of 22,000,000 lbs. fine copper yearly, with 40,000 oz. gold and 200,000 oz. silver.

GREAT COBAR NORTH, LTD.

NEW SOUTH WALES

Address: Thos. Carter, liquidator, 26 Victoria St., London, S. W., England. Liquidated March, 1913, and new company formed under title North Cobar, Ltd., capitalization £350,000, shares 5s. par. Shareholders will receive three 5s. shares in new company for each fully paid share of the old. Each new 5s. share will be credited with 4s. 3d. paid up. Balance of 350,000 shares will be held in reserve.

GREAT FITZROY MINES, LTD.

QUEENSLAND

Office: Collins House, Melbourne, Australia. English office: 20 Copthall Ave., London, E. C., England. Mine office: Mt. Chalmers, via Rockhampton Co., Queensland, Australia. J. L. Wharton, chairman; Major Philip Charley, W. J. Loring, G. P. Doolette, and C. B. Jessop, directors; J. M. Stokes, sec.; T. E. Smith, London, sec.; Bewick, Moreing & Co., cons. engr. and gen. mgr.; John Adam, mine supt.

Registered in Victoria April 24, 1912, as a second reconstruction of the Great Fitzroy Gold & Copper Mines, Ltd., registered May 3, 1907, first reconstructed July, 1908. See Vol. X.

Capitalization £225,000, shares 5s. par; issued 450,000, credited 2s. paid; June 6, only 6d. remained unpaid. Shareholders were offered 1 new share credited 2s. paid for every old £1 fully paid share, up to May 31, 1914. Debentures, £100,000 first mortgage 6% bonds, redeemable on or before April 24, 1915; £42,950 redeemed June, 1913. For fiscal year ending June 30, 1909, net profit was £12,187, of which £11,687 was written off for construction and development, and for fiscal year ending 1910, net loss was £19,753. In year ending April 30, 1913, company's accounts show £184,137 received from metals sold and expenses £169,440, or a net profit of £14,697.

Property the Mt. Chalmers mine with 273 acres, leasehold, about 10 miles northeast of Rockhampton, also the Tungamull estate of 5,050 acres, freehold, 3 miles from the mine, bought for water supply. The mineral property shows a cupriferous formation up to 300' in width, carrying large lenses of ore in sedimentary rocks with intrusive dikes of dolorite. Ore contains auriferous and argentiferous pyrite and chalcopyrite, together with free gold, in a quartzose gangue. Overlying the silicious orebody is a lens of sulphide ore consisting chiefly of mixed sulphides of iron and copper, with barite. The orebody on the 150' level has a maximum width of 120' and known length of 330'.

Development is by three 3-compartment shafts, known as the East shaft, which is at the old workings; the West shaft, which is at the new workings, and "A" shaft, all shallow, 2 being of 225' and 240' depth. Ore reserves were conservatively estimated, March, 1912, at 600,000 tons, averaging 3% copper and 2.51 dwts. gold per ton.

Reserves include 31,611 tons pyrite ore averaging 2.16% copper and \$1.96 in gold, and 475,435 tons silicious ore averaging 2.75% copper and \$2.36 gold, a total of 507,046 tons. Pending a solution of cheap treatment problem, development work was restricted and no attempt made to prove the limits of the orebodies.

Equipment includes a steam plant, with hoists and 8-drill and 20-drill

air compressors. An aerial tram connects the smelter with a railway. A dam has been built at Tungamull with a pipe line to the works.

The concentrating plant, comprising Cornish rolls, grinding pans, jigs, vanners and Minerals Separation Flotation plant, is running continuously and very satisfactorily. In year ending May 31, 1913, the mill produced 14,445 tons concentrate assaying 10.96% copper and \$8.29 gold per ton, all sent to the smelter. The extraction was 84% of the copper and 78% of the gold.

The smelter, formerly having a 100-ton water-jacket blast furnace making matte, was rebuilt and now has two 200-ton water-jacket blast furnaces, converter plant and a sintering plant, to operate under the Dwight-Lloyd patents.

Production for fiscal year ending June 30, was 2,194,293 lbs. fine copper, 32,499 oz. silver and 5,990 oz. gold in 1909; 2,843,246 lbs. copper, 35,204 oz. silver and 6,482 oz. gold in 1910. The production for the fiscal year 1910 was secured at a cost said to have been 32s. 8d. per long ton of ore, with 53,416 tons treated, giving a total cost of about £85,000, against which are to be set about £3,500 for silver production and £26,000 for gold production, leaving a cost of at least £55,000 against 1,287.15 long tons of copper, giving a cost of approximately £42 15s. per long ton for copper, at the mine, in the form of matte, requiring conversion, electrolytic refining, freight and marketing costs, aggregating several cents per pound.

For the 13 months ending May 31, 1913, the works treated 107,098 tons of ore, of which amount 34,887 tons, assaying 2.88% copper and 2.83 dwts. gold per ton were sent direct to the smelter and 71,847 tons concentrated, making 2,050 tons blister copper, containing 2,034.8 tons copper, 1,029.5 oz. gold and 30,475 oz. silver.

The mineral flotation mill is now making a profit of £2,000 a month. Management is experienced and capable. It looks as if a favorable turn had been made in the fortunes of this hitherto unfortunate enterprise.

The company took an option on the Laloki copper mine in Papua, during the past year and spent £2,960 on the property. The mine is 17 miles from Port Moresby and the Government is expected to build a railway to Sapphire creek, 2 miles from the mine. The ore is a basic sulphide carrying 3 to 4% copper and 2 oz. gold per ton. Development is by a 140' shaft with level at 74' with 74' crosscut to lode and 88' drifting on the vein. The property is a promising source of much needed porphyritic ore for the Great Fitzroy Mines, Ltd.

GREAT HERMIDALE SOUTH COPPER CO.

NEW SO. WALES

Idle. Mine at Hermidale, Canbelego Co., N. S. W., Australia. Absorbed, Jan., 1908, the Great Hermidale Copper Co. Has a 370' main shaft.

GREAT LAXEY, LTD.

ENGLAND

Secretary and registered office: J. Crossley, 55 Cross St., Manchester, England. Local secretary and office: T. Garland, Laxey, Isle of Man, England. F. J. Robertshaw, chairman; E. McGee, vice-chairman; preceding officers, T. Stuttard, J. P., W. B. Knapman and Thos. Settle, directors; Capt. John Roberts, mgr. Organized March 3, 1903, under laws of Great Britain, as a reconstruction of Great Laxey Mining Co., Ltd., capitalization £30,000, shares 10s. par, in 45,000 priority and 15,000 ordinary shares, fully issued and fully paid. The old company paid dividends to 1899, aggregating £36 15s. on each £4 share. Present company has paid dividends aggregating 60% on priority shares and 5% on ordinary shares.

Lands, 1,103 acres, held under 31-year leases, expiring Oct., 1933, at a royalty of 2½%. Lands carry lead, zinc and copper sulphides.

GREAT NORTHERN COPPER SM. CO.**NEW SOUTH WALES**

Idle. Works office: Newcastle, Northumberland Co., N. S. W., Australia. Property is a small smelter, turning out blister copper of about 98.5% average tenor, carrying some gold and silver.

GREAT ZEEHAN DUNDAS SILVER LEAD**MINING CO., N. L.****TASMANIA**

Mine office: Zeehan, Tasmania, Australia. The company owns a group of claims aggregating 33 acres, near the town of Zeehan, on the west coast of Tasmania. Though called a silver-lead mining company, its property has 3 veins, showing copper, which extend into the holdings of another company where they are now being prospected. A lode, previously unknown, was opened in 1913 by a tunnel driven to crosscut the 3 veins already worked. This new vein is 4' wide with 1' paystreak carrying 7% copper, 50 oz. silver per ton and 63% lead. The southwest portion of the property shows an ironstone outcrop 20' wide carrying tin.

GRÖNLANDSK MINEDRIFTS AKTIESELSKAB**GREENLAND**

Office: Raadhuspladsen 37, Copenhagen, Denmark. Mine office: Allan-gorssuak, South Greenland. E. Glückstadt, chairman; M. Ib. Nyeboe, managing director; preceding officers, Chr. Hasselbalch, G. Halkier and H. P. Prior, directors; E. Höeg, smelter supt. Organized May 31, 1907, under laws of Denmark, capitalization 1,000,000 kroner, in shares of 500 kroner and 1,000 kroner par.

Property is situated on the outmost cape of a peninsula, not far from the Cryolite mines at Ivigtut. The mine known as the Josva, or Allan-gorssuak shows bornite and chalcopryite ore, with some malachite near the surface, occurring in a 1¼' vein, or mineralized fault fissure in metamorphic schist and also as an interbedded lenticular mass of copper-bearing schist. The vein runs N. E., dips at 70° and is proven to a depth of 400'. The ores are estimated to average 6% copper, with traces of precious metals.

Development includes 2 shafts, each 400' deep and a 70' prospect shaft. Equipment includes 200 h. p. plant with 2 hoists good for a depth of 450', 4 Ingersoll air compressors and 24 buildings. There is also a 36" water jacket Fraser & Chalmers furnace, making 20% matte and using coke costing \$7.50 per ton.

GUACIMO; MINA.**PANAMA**

Probably closed down. Mine at Las Minas, Los Santos, Panama. Mine, formerly held by the Boston-Panama Mining Co., has a 70' shaft, with a crosscut to the east showing several veins, reported to carry cuprite and chalcopryite, and a west crosscut showing veins of 30" and 7' width, both carrying chalcopryite. Mine is wet.

GUAYACAN SMELTER.**CHILE**

Owned by Sociedad Chilena de Fundiciones.

GUERNICA SILVER & COPPER MINES**(BOLIVIA), LTD.****BOLIVIA**

Office: 28 Victoria St., London, S. W., England. Mine office: Uyuni, Potosi, Bolivia. Nicol Brown, chairman; T. Huntington, C. D. Rotch, P. Coventry Tarbutt and H. de Winton, directors; F. C. Potter, sec. Organized Dec. 31, 1908, under laws of Great Britain, capitalization £110,000, shares £1 par; issued £100,007, fully paid.

Property 117 hectares (289 acres) situated in Sur Chicas province, 80 miles south of Uyuni, the nearest point on the Antofagasta railway, bought for £5,000 cash and £57,500 in fully paid shares, with a deferred payment of £10,000, payable out of the first profits. Claims carry 6 veins with 5% copper ore rich in silver. Owners are installing a concentrator. Company needs funds as property requires about \$100,000 to bring it to a profit.

able stage. The company tried traction engines which would not work on the very steep mountainous roads.

GUIDE MINING CO.

TRANSVAAL

Lord Islington, chairman, 4 Broad St., London, E. C., England. Mine office: Palabora, Zoutpansburg, Transvaal, S. A. Company has extensive holdings about 4 miles north of Lulu Kop near Palabora, 50 miles east of Leysdorp, which show many native workings on disseminated ores in pyroxenite. The Government geological report says the ore occurs as chalcopryrite and bornite in seams, patches and disseminations, in a pink orthoclase pegmatite that cuts pyroxenite. The latter rock is a local smeary differentiation product of the prevailing granite of the region. The property is now idle, and in a caretaker's hands as the 120' shaft failed to show any vein and the low grade of the ore did not warrant further work in so remote a place.

GUILLERMO CARVALLO.

CHILE

See Carvallo; Guillermo.

GUILLERMO GRUNDY.

PERU

Mine at Musquituni, Lampa, Puno, Peru. Lands, 6 hectares, known as the Limón Verde and Berenguella mines, both carrying argentiferous copper ores. Smelter, known as the Fundición de Las Maravillas, has a daily capacity of about 40 metric tons.

GULF CREEK COPPER MINE.

NEW SOUTH WALES

Office: 18 Fenchurch St., London, E. C., England. Mine office: Gulf Creek, Murchison Co., N. S. W., Australia. London Metal Banking Co., owner. Robt. Schloesser, gen. mgr. Land, 248 acres, known originally as the Cornish, and latterly as the Gulf Creek mine, 22 miles from Barraba, the nearest rail point, held under a 20-year lease. The property shows schist and quartzite, of early Silurian age, altered through basic intrusions and indurated clay-slate of Carboniferous age, with dikes of serpentine. There are 4 parallel veins, of 10 to 40' estimated average width, traceable 300'. The upper workings of the mine carried melaconite, azurite and malachite, but these have been exhausted, and the ore at depth is slightly auriferous and argentiferous chalcopryrite, in a gangue of about 50% pyrite, 15% silica, 7% alumina and 5% lime. The Big vein was on fire, from spontaneous combustion, but burned out, 1905, and as a result yielded 500 tons of natural matte, of 12 to 20% copper tenor, from ore averaging about 3% copper. The mine has 15 small shafts and a main shaft 470' deep, 1911, with about 4,280' of workings, estimated to show about 150,000 long tons of ore blocked out for stoping, or about 3% copper tenor.

Equipment includes a 150-h. p. steam plant, with a 20-h. p. hoist good for 500', and an air compressor.

The smelter, connected with the mine by a half-mile ground tram, built 1896, has two 15-ton reverberatory furnaces turning out matte of about 35% copper tenor, and a small cementation plant.

GUMESHEVSK MINE.

RUSSIA

Owned by Sissert Co., Ltd., and described under that title.

GURINSKY MINE.

RUSSIA

Is a group of copper mines in the Bogoslov district and in the Ural mountains, 8 miles from Bogoslovsk. The ores occur in deposits like a lode and average 5% copper, according to recent reports.

HAFOD COPPER WORKS.

ENGLAND

Owned by Vivian & Sons and described under that title.

HAMLEY MINING CO.

SOUTH AUSTRALIA

Office: Grenfell St., Adelaide, South Australia. Mine office: Wallaroo, South Australia. John S. Scott, sec.; Wm. Holland, mgr., at last accounts.

Under various ownerships the mine has paid dividends of £58,899, and to end of 1912 the company had received subsidies of £2,000, from the South Australian government.

Lands, 581 acres, Crown lease, adjacent to the Moonta mine, show 6 fissure veins in porphyry varying 1 to 6' in average width, with occasional widths of 10 to 15'. The veins are practically parallel with strike of north 20° east and westerly dip. Mine opened 1861 and worked almost continuously since, is on the Karkarilla vein, 6 to 12' wide, in porphyry. The vein consists of quartz and feldspar with seams and stringers of bornite and chalcopyrite, the ore as a whole averaging about 3½% copper.

Development is extensive, there being 2 main inclined working shafts, one 1,050' deep with levels at every 10 fathoms and long drifts on the vein, aggregating several miles. Most of the ore extracted in 1912 was from the 200', 300' and 360' levels.

Equipment includes a steam plant, with 3 hoists, including a new hoist installed 1909 at No. 2 shaft, and an air compressor. The mill, a quarter-mile from the main shaft, and connected by a surface tram, is of about 50 tons daily capacity. Its equipment is antiquated, consisting of a crusher, Cornish rolls, 1 jig and 3 buddles, but the mill is doing good work notwithstanding. Ore is dressed to 18 or 20% copper tenor and concentration is about 11 into 1. The smelter contains 3 blast furnaces which were in operation in 1912.

Production, 1903-06, was 17,756 long tons of ore, yielding 3,636 tons of concentrates of about 16% average copper tenor. Produces an average of 15 tons daily. During first half of 1912, produced 1,400 tons blister copper, or 379,600 lbs., and the year's production was about 700,000 lbs. It seems probable that with adequate capital and further development the mine might be made payable.

HAMPDEN CLONCURRY COPPER MINES, LTD. QUEENSLAND

Address: Edwin Habben, secretary, 360-366 Collins St., Melbourne, Australia. English office: Palmerston House, London, E. C., England. Mine office: Cloncurry, Beaconsfield Co., Queensland, Australia. J. L. Wharton, chairman; Hon. Wm. Laurence Baillieu, vice-chairman; H. H. Schlapp, Wm. Orr, H. F. C. Keats and Harvey Patterson, Australian directors; Wm. Douglas Reid and Godfrøy W. W. Mackinnon, London directors; Edw. Herbert Schackell, Queensland, sec.; Erle Huntley, gen. mgr.; T. Warrick, supt. Hampden mine; J. O'Connell, supt. Duchess mine; D. Wentworth, metallurgist.

Organized March, 1906, under laws of Victoria, as successor of Hampden Copper Mines, N. L., capitalization £200,000, increased Feb., 1907, to £300,000, shares £1 par, and reorganized July 31, 1909, under laws of Victoria, capitalization £300,000, shares £1 par; issued, £250,000; fully paid. The plan of reconstruction, 1909, increased the capitalization to £400,000 in April, 1912, shareholders receiving 1 new share credited as 15s. paid for every old, fully paid £1 share. Bonds £60,000, 6½% debentures, issued in June, 1913, after a similar issue had been redeemed a few months previous. A 2s. dividend was declared payable Sept. 6, 1913, compared with 4s. previously paid. Shares are listed on the London, Melbourne, Sydney, Adelaide and Brisbane stock exchanges.

This company, formed by the Ballieu group in Melbourne for the purchase of the Hampden and Duchess mines in the Cloncurry district, Queensland, also owns the Mascotte, Hampden Central, Hampden Queen, Havoë, John Egan, Imperial, Jubilee and Scalper properties, and recently bought the Trekelano mine. In 1913, the MacGregor and Salmon mines were bought from the MacGregor-Cloncurry Copper Mines, Ltd., for £108,-

500, largely because the ores are a desirable smelting mixture. The Answer and Gilded Rose mines are held under option.

The Hampden mine shows a strong lode developed for nearly a half mile that has 3 known orebodies in kaolinized slate and quartzite of Silurian age. The north orebody is the only one mined at present and worked by a 443' shaft (No. 2). The ore consists of chalcopyrite and bornite in bunches and veinlets constituting a stockwerk. The average value of the ore now mined is 7.9%. Ore production is almost entirely from No. 2 shaft, situated at the north end of property, with extensive workings in 100', 200', 234', 275', 290' and 300' levels. The ore reserves, Sept. 12, 1912, are given as 88,000 tons, containing 6,600 tons of copper. Nos. 1 and 3 shafts are also on the lode which dips steeply to the west. Development for half-year 1912 amounted to 360'. Production for year ending Aug. 31, 1912, was 8,900 tons of 9.9% ore and 2,635 tons of 7.9% ore, and for one-half year ending March 31, 1913, 9,510 tons of 8.5% ore.

The Duchess mine is about 40 miles west of Hampden at Mairindi (Duchess P. O.). Claims have a well-defined fissure vein containing high-grade bornite ore carrying a little chalcopyrite. The working shaft is 601' deep and has levels down to 550'. The 550' level, developed northward, now 549' long, shows 5' of high-grade ore that averages 17.1% copper. A winze sunk 120' below this level shows bornite ore averaging 21% for 70', the whole winze averaging 20% copper. Reserves Sept., 1912, are given as 80,000 tons of 20% ore and 56,000 tons of 5.6% ore, a total of 38,278,000 lbs. copper gross.

For the 6 months ending March 31, 1913, mine yielded 12,121 tons of 17% ore, a total for the year of 16,989 tons, averaging 17.3% copper. Mine is said to show a second vein, also in syenite, and there are a number of lesser shafts which are not operated.

The Trekelano mine is located 9 miles south of the Duchess and contains a strong vein carrying high-grade ore in schist, ore containing 8 to 25% copper. In May, 1912, the shaft, 121' deep, was being sunk in quartzite and hornblende schist. The 80' level shows an orebody 400' long averaging 8% copper. Ore reserves, Sept. 12, 1912, were 12,000 tons containing 1,680 tons copper.

The Mt. Mascotte mine, 14 miles north of the Duchess, has developed a vein averaging 20" wide to a depth of 169' with an assay value of 14.8% copper. Reserves are estimated at 2,500 tons, containing 400 tons copper.

The Salmon mine is worked for its fluxing ore and has 20,000 tons of 1% ore developed.

The MacGregor mines, purchased from the MacGregor-Cloncurry Mines, Ltd., show strong quartz veins in schist with orebodies 7 to 10' wide, averaging 8% copper. In 1912, the mine yielded 2,300 tons of 6% ore and the ore reserves were estimated at 87,200 tons of 8% ore with 50,000 tons of 4% ore. The shaft is 250' deep with a south level 322' long, all in ore. May, 1913, new owners started work on the Wallaroo mine, the 11' level being extended 90' through 1% ore and the south drift 93' through quartz pyrite carrying one-half per cent copper.

The Answer is a new mine near Selwyn P. O., 13 miles southwest of Mt. Elliott. Opened in 1912 by 2 shafts sunk to water level, showing high-grade bornite and glance ore.

The Gilded Rose held under option, 1912, employed 6 men developing gold and copper ore.

The Hampden Queen and Hampden Central mines at Friezland were developing in 1912. The Havoc, Imperial and Jubilee mines at Springs P.

O. and the John Egan mine, at Heightsville, were developing in a small way in 1912.

The smelting plant is located at Hampden and was blown in July, 1912. It contains 2 furnaces, one 42x84", the other 42x168", connected with a steel stack 8' in diameter and 170' high. The Hampden ore, which is a heavy pyritic material, is screened and the fines, mixed with the materials from the other mines, is sintered in a Dwight-Lloyd machine before charging. The 55% matte is converted in shells, 7½x10½'. A labor strike caused a shut-down throughout June, 1913.

The central power station has 3 gas producers of 500 h. p., 3 gas engines of 320-h. p. and 2 of 200-h. p., run tandem.

Production for the half year ending March 31, 1913, was 3,538 tons of fine copper, 1,687 oz. gold and 38,144 oz. silver produced from 24,874 tons of ore and 2,125 tons of old matte. Of the total ore treated 9,510 tons of 8½% ore came from the Hampden mine and 12,121 tons of 17% ore from the Duchess mine. Production in May, 1913, was 1,570,240 lbs. copper from 6,600 tons of ore.

The property has been developed under many disadvantages, with discouraging delays and an expense much greater than anticipated, but the work seems to have been well done, the new smelter working satisfactorily, the mines promising and the company's prospects for continued dividends improved.

HAMPDEN CONSOLS MINE.

QUEENSLAND

Owned by Mt. Elliott Co., Ltd., and described under that title.

HAMPDEN SOUTH CONSOLS MINE.

QUEENSLAND

Owned by Mt. Elliott Co., Ltd., and described under that title.

HANAOKA MINE.

JAPAN

Address: Kumakichi Ishida, owner, Hanaoka, Kita-Akita, Ugo, Japan. This is a mine in northern Japan opened 1907, developed for several years past, producing about 250,000 lbs. copper in 1908, but reaching the million mark for the first time last year. Production was 22,996 lbs. fine copper in 1911 and 1,895,008 lbs. in 1912.

HANSEATIC MINING CO.

GERMAN S. W. AFRICA

Company did considerable prospecting in the Rehoboth territory in 1912, but found no payable ore deposits and has abandoned the field.

HARNECKER; OTTO.

CHILE

Office, mine and works: Ligua, Aconcagua, Chile. Organized 1883. Property consists of 5 mines and a small smelter called Peña-Blanca. Otto Harnecker, sole owner.

El Carmen mine has orebodies in blanket deposits, or beds, in fossiliferous limestone. The beds carry chalcoppyrite, with oxidized copper ores, over a wide extent of territory and extending for 6 kilometers (3.6 miles) along their strike. There are 5 to 8 of these bedded deposits recognizable, the main bed averaging 3' in thickness, dipping 31° and showing oxidized ores for 20 meters, succeeded by sulphide ores. The lode is opened by an 80-meter crosscut tunnel, with about 250 meters of laterals, all in ore averaging about 4.5% copper. Mine has about 25,000 tons of ore developed and is considered promising.

The Mina Maquis, 4 kilometers from the smelter, has 8 parallel veins in porphyry, reported by the owner to be traceable about 15 kilometers, with strike of north 18° east and dip of 43°, with widths of 5 to 12'. The ore below 30 to 50 meters in depth carries chalcoppyrite with granitic gangue, averaging 5% copper, ore being especially suitable for fluxing the silicious ores of the other mines of the district. Mine has reserves of about 20,000 tons of ore.

Las Luías mine, on the same veins as Los Maquis, but 3 kilometers north, has chalcopryite averaging about 3.5% copper, with 15,000 metric tons of ore developed. San Pedro mine, carrying ore about 6% average copper tenor, has reserves of about 10,000 metric tons. Mr. Harnecker also owns several other promising claims, including the Colique and Santa Ana.

The smelter, known as the Fundición de Peña Blanca, 5 kilometers from the station of Ynjenio, has a 30-ton cylindrical water-jacket blast furnace, using Westphalian coke making matte of 48 to 55% copper tenor, from ores averaging 5 to 5.5% copper. The smelter gives very clean slags, assaying down to 0.2% copper, and does a custom business that is a blessing to the small operators of low-grade mines in the vicinity of La Ligua and Cabildo. The smelter handled 3,024,940 kgs. of 6% ore in 1912, producing 36,270 kgs. of 50.2% copper matte, at a cost of \$63 (Chilean currency), or 66 cts. per lb.

Recent production has been as follows: 311,972 lbs. fine copper in 1903; 342,043 lbs. in 1904; 354,646 lbs. in 1905; 190,455 lbs. in 1906; 126,764 lbs. in 1907; 156,625 lbs. in 1908; 221,280 lbs. in 1909; 150,000 lbs. in 1910; 186,500 lbs. in 1911, and 400,000 lbs. in 1912. The matte, or regulus, is shipped to the Société des Mines de Cuivre de Catémou.

Mine about 100 yards from the great Longitudinal railroad of Chile. The owner is gradually acquiring new properties and has proven a thoroughly capable manager. The mines and smelters are operated on a modest scale, but along sound lines.

HARPURS HILL MINE.

QUEENSLAND

Near Mt. Perry, Queensland, Australia. Originally owned by Harpurs Hill Co. and later by Normanby Syndicate, Ltd., F. M. Kirby, liquidator. Now held under lease. Present operators have sunk new shaft and opened up high-grade copper ore from which small shipments were made in 1913. Veins are too small and the development insufficient to supply the concentrator erected by the Normanby Syndicate with ore. Is a leasing, not a mining proposition.

HATASA MINE.

JAPAN

See Ono Mining Co.

HAUT-KATANGA; UNION MINIERE DE.

BELGIAN CONGO

See Union Minière de Haut-Katanga.

HEIHACHI TANAKA.

JAPAN

Owns the Kunitomi mine, Hokkaido, Japan, which produces gold and silver-bearing copper ores. The mine employs 360 hands and has a 174-h. p. plant. Production was 1,583,911 lbs. copper with \$22,005 in gold and \$28,362 in silver in 1911 and 1,924,688 lbs. fine copper in 1912.

HELSINGBORG'S KOPPARVAERK AKTIEBOLAGET. SWEDEN

Office: Helsingborg, Malmöhus, Sweden. Works at Raus Plantering, near Helsingborg. Lord Lieut. G. Tornerhjelm, pres.; Hon. Albert Berg von Linde, vice-pres.; Consul C. Ingelsson, managing director; Consul Ivar P:son Henning, Prof. Carl Sjunnesson, secondary officers; G. A. Thulin, asst. managing director; Vice Consul G. Lindegren, Arthur Ramén, chief engr.; Axel Sundberg, smelter engr.; Sten G. Lilja, chemist; Ernest E. Brand, supt. briquetting plant; R. Franzen, assayer.

Organized 1900, under laws of Sweden, capitalization 500,000 kroner, increased, 1903, to 1,000,000 kroner, again increased, 1906, to 1,500,000 kroner. Shares 1,000 kroner par. Net earnings, 1912, were 873,339 kroner. Dividends 30% in 1911, 30% 1912. Annual meeting in May.

Company was originally formed to treat cinder from pyrite burners by chloridizing, roasting and leaching in order to extract copper from the

residue of the Skanska Superfosfat and Svafvelsyrefabriken. This proving profitable the present company was organized to build a large plant to handle the Sulitelma cinder from the sulphuric acid works. Company receives the cinder by boats from the different wood-pulp and acid works of Norway and Sweden at Rää, where grab buckets unload it into cars on the electric railway, 2 miles from the works.

Property consists of 25 acres containing power station, crushing plant, etc. The finely-ground material is treated in 7 mechanical furnaces handling 45 tons each per day. These Ramón-Beskow furnaces are used in most wet copper works throughout Europe. Smelting department includes 3 gas-fired regenerative reverberatory furnaces handling 15 tons copper precipitate each 24 hours.

The leaching department includes 35 tanks holding 30 tons for leaching roasted ore. The solution passes into 17 tanks with mechanical stirrers in which the copper precipitate is obtained. This precipitate is briquetted in hydraulic machines. The silver-bearing precipitate will in the future be sold to electrolytic refineries, but has been treated by Claudets process in the past. The residue, or blue-billy, is briquetted by channel furnace process, using 3 furnaces of Ramón channel type handling 75 tons per day. No binding material is used.

The burnt ore received by the company averages 3.6% copper, 2% zinc, 4½% sulphur and 1 oz. silver per ton. After treatment the residue contains 0.07% copper, 0.15% sulphur, 0.1% zinc and 61% iron.

The copper is run into ingots marked HAK with 99.8% copper, B 99.75%, C 99.7% and G 99.5% copper, the first two brands being used for brass and copper sheets, the third for alloys of high quality and the last for casting purposes.

In 1912 the works treated 83,786 long tons yielding 4,432 tons of cement copper, 63,387 tons of iron cinder, 1,559 lbs. of silver, the total product being 8,691,361 lbs. of refined copper, including 1,149 tons of bessemer copper from the Sulitelma mine, treated in the refinery.

HENDERSON & CO., LTD., WM.

SCOTLAND

Works office: Irvine, Ayrshire, Scotland. Property is a plant for leaching copper values from cinders remaining from the burning of cupriferous pyrites.

HENDERSON'S TRANSVAAL ESTATES.

TRANSVAAL

Idle. Mine at Berkenrode, Zoutpansberg, Transvaal. Property is in the vicinity of the Messina mine. Development on the copper deposit was begun about July, 1909, and suspended 1912.

H. E. PROPRIETARY, LTD.

TRANSVAAL

Secretary and offices: W. Smith, 10-11 Austin Friars, London, E. C., England. Local sec. and office: H. Williams, City House, Harrison St., Johannesburg, Transvaal, S. A. F. H. Hamilton, chairman; L. Ehrlich, A. L. Secretan, Capt. F. B. Lawson, directors. Local committee, J. H. Rainier, J. A. Cohen, Johannesburg. E. T. McCarthy, cons. engr. Company registered Aug. 19, 1901, capitalization £150,000, shares £1 par; 130,200 issued and fully paid.

Company owns 357 claims and has options on other properties, including a copper property, in the eastern portion of the Murchison range, Transvaal.

HERBERT-IRVINE COPPER MINES, LTD.

ENGLAND

Secretary and offices: G. Baker, 48 Dover St., Piccadilly, London, W., England. S. Irvine, D. Herbert, G. Baker and W. H. Brown, directors. Organized May 23, 1912, capitalization £5,000, shares 3,000 preferred at £1

par, 40,000 ordinary at 1 s. par; 1,700 preferred issued and 36,200 ordinary issued and fully paid.

Company has lease of mining rights on Fair island, 1 of the Shetland Island group, for 24 years, on royalty of 10% of net value.

HERKULES FRISCHGLÜCK-STOLLN UND KIESELS

HOFFNUNG-ERBSTOLLN.

GERMANY

Office and mine: Johanngeorgenstadt, Saxony, Germany. E. R. Poller, manager, at last accounts. Mine, in the vicinity of Schwarzenberg, carries sphalerite and chalcopryrite, and is a small producer, mainly of zinc blende.

HERRERIAS; MINA LAS.

SPAIN

Owned by Bede Metal & Chemical Co., Ltd., at Puebla de Guzman, Huelva, Spain.

HIBIRA MINE.

JAPAN

Mine office: Kitakata, Higashi-Usuki, Hyuga, Japan. Seikyo Naito, owner. Mine is an old property, located on the eastern bank of the Tsun-ansegawa, a branch of the Gokasegawa, which gives deep water transportation. The mine produces pyrite, with some chalcopryrite averaging 5 to 6% in copper tenor, in thin 5-20' lenses in clay-slate and sandstone. Equipment includes power installations aggregating 810-h. p. Production was 1,930,734 lbs. fine copper in 1908, 1,800,963 in 1911, and 1,932,368 lbs. in 1912.

HICKEY & BROWNE.

TRANSVAAL

Office and mine: Motale, Zoutpansberg, Transvaal. G. Hickey and E. G. Browne, owners. Lands, 1,200 claims, 2,000 acres, held under license from the government, on the Motale and Lumbuvi rivers, in the Pietersburg district. Property shows fissure veins in diabase, and contact deposits between diabase and quartzite, both with a generally east-west strike, and nearly vertical dip, there being 10 known orebodies, of which 5 are under development. Veins are of 2 to 30' width, and traceable for 2 miles, carrying some native copper, malachite, azurite and bornite, but mainly chalcocite, giving assay values up to 70% copper, 20 oz. silver and up to 3 dwts. gold per long ton. Mine has pits and shafts of 20 to 118' depth with about 350' of laterals giving a promising showing of high-grade ore.

Owners are shipping 5 tons glance monthly, averaging about 40%.

HIGUERA; FUNDICIÓN DE LA.

CHILE

Owned by Felix Vicuña, at Higuera, Coquimbo, Chile.

HILDA MINE.

CHILE

Mine office: Higuera, La Serena, Coquimbo, Chile. Richard H. Everitt and Juan Bode, owners and managers, at last accounts. Lands, 2 perteneccias, 10 hectares, 12 miles north of Higuera, carrying 3 parallel veins in diorite and granite. Main vein about 30' wide at surface, shows chrysocolla and carbonate ores of good tenor, opened by shafts of 20' and 50'. Ore produced averages 15% copper, after cobbing, and is sold to the Sociedad Minera San Juan.

HIMMELFAHRT FUNDGRUBE.

GERMANY

Office: care Kgl. Sächs Staatsfiskus, Dresden, Germany. Mine near Freiberg, Saxony, Germany, is owned and operated by the Saxon Crown, employing about 1,100 men. Production is about 12,000 metric tons of ore yearly, mainly silver-lead, including about 2,000 metric tons of highly argentiferous chalcopryrite and arsenopryrite.

HIRAGANE MINE.

JAPAN

Mine office: Funatsu, Yoshiki, Hida, Japan. Takaoki Yokoyama, owner; S. Tsubouchi, supt., at last report. Mine carries silver-copper ore and has steam and electric plants aggregating 460-h. p. Production was 960,351 lbs. fine copper in 1906; 1,392,280 in 1907; 1,023,386 in 1911 and 1,083,180 lbs. copper in 1912.

HISANCHI MINE.**JAPAN**

Owned by Mitsu Bishi Co.

HISANOSUKI ISHIHARA.**JAPAN**

Owns the Akagane mine, Hyogo, Japan, having a small power plant and producing 93,042 lbs. copper with \$2,776 worth of silver, by a force of 85 men, in 1911 and 152,874 lbs. fine copper in 1912.

HITACHI MINE.**JAPAN**

Owned by Fusanosuke Kuhara, manager. Mine office: Hitachi Ibaraki Tokio, Japan. Property is a new mine of much promise carrying ore averaging about 4.5% copper tenor, and finished copper is said to cost between 9 and 10 cts. per lb. laid down. Equipment includes power installations aggregating 3,420-h. p. Forces average 1,013 hands. Production was 577,560 lbs. fine copper, 1906; 1,767,169 in 1907; 2,229,901 in 1908; 15,387,798 in 1909; 11,251,759 in 1910 and 12,409,152 lbs. fine copper in 1912.

HOFRET-EL-NAHAS MINES.**SUDAN**

Mine at Hofret-en-Nahas, Kordofan, Anglo-Egyptian Sudan. Lands, in southwestern Kordofan, are worked in a small way, to meet purely local demands, ore being smelted in primitive furnaces at the mine.

HOHIGSMUND HAMBURG; GEWERKSCHAFT.**GERMANY**

Is an iron mining company near Gosenbach, Westfalen, Germany. Albert Schneider, Wilhelm Utch, Jacob Kreutz, Friederich Haas and Josef Hermeling, executive committee. Property is an iron mine, employing about 300 men, producing annually about 35,000 tons of iron ore, and 40 tons of copper as a by-product.

HOKOISHI MINE.**JAPAN**

Idle. Mine at Kamo, Nii, Iyo, Japan. Is a lenticular deposit of chalcopryrite, associated with pyrite in folded chloritic schists, about 1' thick. Ore carries 3.5 to 4% copper. Production 1900, was 52,373 lbs. fine copper. It is a small mine and probably unworkable except when copper prices are high.

HOLMHOLMEN COPPER CO., LTD.**NORWAY**

Property sold to Ranen Copper Co., Ltd., Jan., 1913.

HOMANZAN MINE.**JAPAN**

Mine office: Adakaya, Yatsuka, Izumo, Japan. Tojiuro Hori, owner and manager, at last accounts. The mine carries copper ore without appreciable gold or silver values. Equipment includes a 356-h. p. steam installation, and forces averaged 491 hands in 1908. Production was 699,331 lbs. fine copper in 1907; 1,017,501 in 1911 and 778,306 lbs. fine copper in 1912.

HONGROISE DES CUIVRES; SOCIÉTÉ.**HUNGARY**

Office: 13 Chaussée d'Antin, Paris, France. Mine office: Zám, Hunyad-Megye, Hungary. Comte de Choulet, chairman; D. Reimbert, supt. Organized under laws of France, as successor of Société Anonyme des Cuivres de Transylvanie.

HONGROISE DES MINES; COMPAGNIE.**HUNGARY**

Office: Brussels, Belgium. Mine office: Urvölgi, Hungary. Comte C.-F. de Ferré de Peroux, chairman. Organized Feb., 1903, under laws of Belgium, capitalization 1,500,000 francs. Dividend, for fiscal year 1906, was 7 francs 50 centimes. Controls the Société de La Mine de Cuivre Urvölgi, which owns the Urvölgi mines in Hungary.

HONJYO COPPER WORKS.**JAPAN**

See Furukawa Mining Co.

HOVIN KOBBERMINER; AKTIESELSKABET.**NORWAY**

Address: Hovin, Christiansand, Norway. Property includes small copper mines at Hovin, Bodin and Gransherred. Production about 415 metric

tons of ore, averaging 12% copper tenor, giving a yearly production of approximately 100,000 lbs. fine copper.

HUACHUMACHAY; SOCIEDAD MINERA.

PERU

Mine address: Huachumachay, Yauli, Junin, Peru. Organized 1900, under laws of Peru. Property consists of a group of 10 pertenencias, including the Santo Domingo and Huachumachay mines, developed by a tunnel. The claims are traversed diagonally by the vertical Crucero and Octavio veins, giving a long ore shoot on the Veta Crucero, where the vein is $2\frac{1}{2}'$ wide and carries quartzose ore averaging about 12% copper and 2 kgs. silver per metric ton. The Veta Octavio is barren away from this intersection.

The mine has an amalgamation mill and a 40-ton smelter. Forces average 80 men at wages of about 0.8 pesos daily. Production was 133,152 lbs. fine copper in 1904; 149,030 lbs. copper and 1,066 kgs. silver in 1906; 86,420 lbs. copper and 592 kgs. silver in 1907.

HUANCHACA DE BOLIVIA; COMPANIA.

BOLIVIA

Office: 29 Rue de Londres, Paris, France. Mine office: Pulacayo, Potosi, Bolivia. E. Sénéchal de la Grange, chairman; F. Puelma, vice-chairman; Luis M. Solá, gen. mgr.; Segundo R. Nava, gen. sec.; preceding officers and H. Marijon, directors; E. Langlois, chief engr. Organized 1873, and reorganized 1891, under laws of Bolivia, capitalization increased, 1877, and again, 1891, to 12,800,000 bolivars, about \$8,000,000, shares \$25 par, fully paid. Recent dividends have been 8s. in 1895; 12s. in 1900; 6s. in 1901; 4s. in 1902; 4s. in 1903; 4s. in 1908. Accounts to Dec. 31, 1911, submitted in May, at Valparaiso, showed 61,298 bolivars carried forward; reserve fund, 1,000,000 bolivars.

Property of this company comprises several silver mines with 3,000 acres land at Pulacayo, whose ores yield copper as well as gold and silver, and are treated in company's smelting and refining plants. The veins carry complex sulphide ores with values mainly in silver, but also giving considerable amounts of lead, copper, zinc, antimony and gold, the copper production being mainly from argentiferous tetrahedrite.

The company has smelters at Pulacayo and Playa Blanca, latter, formerly leased to the American Smelting & Refining Co., now idle. In 1907, the company shipped to the Tacoma smelter 1,600 tons of ore averaging 5% copper, 5% zinc and 50 oz. silver per ton, containing 160,000 lbs. fine copper. Production estimated at 150,000 lbs. fine copper annually.

Company also owns 25 miles of railway, connecting Huanchaca with the Antofagasta (Chile) and Bolivia railway, and a 600-mile telegraph system.

HUANTAJAYA; SOC. INTERN'L MIN. i BEN. DE.

CHILE

Office: Iquique, Chile. Mine near Huantajaya, Tarapacá, Chile. Organized June 27, 1909, capitalization 300,000 pesos, shares 50 pesos par. Company inactive for several years.

HUARON; SOCIEDAD CUIVRE DE.

PERU

Owned by a French syndicate. Properties near Haiday, 35 miles from Cerro de Pasco. Company is actively developing the Travieso and other veins and has installed a 30-drill compressor. No ore will be shipped until development is further advanced.

HUECA MINE.

SPAIN

An old Roman mine, worked by Huelviana Co. and later by Dallas Pyrite Co.; won by litigation by Carlos Diaz and now under option to J. R. Catlin, 6 Norris St., London, England.

Developed by crosscut 450' long, showing great thickness of 1% copper ore with 3 veins aggregating 65' of 4% ore. Property lies in 1 of 3 conical hills of igneous rock, located as the Hueca, Guia and Ures mines. Orebody dips south (contra) into Oriente de Tharsis mine, which see.

HUELVA COPPER & SULPHIDE MINES, LTD.**SPAIN**

Office: 6 Old Jewry, London, E. C., England. French office: 17 Blvd. Haussmann, Paris, France. Mine office: Almonaster, Huelva, Spain. P. Lyttleton Gell, chairman; H. Gaillochet, vice-chairman; Chas. Forbes, sec., London; preceding officers, G. Dyckhoff, L. Donnet, H. Higgins, G. Chantlaire, J. Roux-Brahic, H. Bondonneau and Comte C. de Leusse, directors.

Organized Oct. 28, 1903, under laws of Great Britain, capitalization £400,000, increased 1907 to £600,000, but reduced again in July, 1912, to £420,000; 210,663 shares issued and fully paid. Company is a reconstruction of the Huelva Central Copper Mining Co., Ltd. Accounts for 18 months to June 30, 1912, showed a loss of £20,973, written off under the capital reorganization scheme.

For 1907, mining profit was £63,177 10s. from which was paid a 1s. dividend Oct. 25, 1907, amounting to £24,324 7s., company ending the year with a balance of £38,853 3s. Profits for 1908 were £16,439 5s. 2d., and £51,167 18s. 2d. was written off for depreciation, etc. Apparently the company should have had £2,485,999 in the hands of its French agents, Aug., 1909, but there was a great shrinkage, owing to misappropriation of funds. Shares are listed on the Paris Bourse.

Company owns the Cueva de la Mora and Monte Romero mines, comprising 246 hectares (507 acres) and other properties of 650 hectares, lying between the Rio Tinto and Tharsis properties, Huelva, Spain; also 27 hectares leased to the Tharsis Copper & Sulphur Co., Ltd., on royalty. Lands are favorably located and are traversed by the Olivargas and Juliana rivers. The company is reforesting its lands with pine and eucalyptus.

The Monte Romero is the principal mine, and the Corta, San Alberto and Angelita mines have reserves of smelting and sulphur ores, but need development. The Corta ore is low grade, but in large deposits, and the mine is estimated to contain 5,000,000 long tons of cupriferous pyrite, averaging 1.7% copper. The San Alberto mine, opened by shaft, has produced a little ore of good average grade. The Monte Romero carries ore of 1 to 5% copper tenor, but some of the ore is highly zinckiferous. Mine has a good equipment, including a haulage plant and large ore bunkers. A new pyritic smelting plant has recently been built.

The company has built a complete town for its workmen, numbering about 1,200 men, the town having a normal population of about 5,000. The company's buildings include schools and hospitals, with necessary mine structures. Transportation is by a 13-kilometer railway, connecting with the Zafra y Huelva line.

Production was 5,563 tons of cupriferous pyrite in 1905; 20,523 tons in 1906; 34,905 tons in 1907; 48,511 tons of ore and 67 tons of cement copper in 1908. Production of fine copper is estimated at 175,000 lbs. in 1905; 600,000 lbs. in 1906; 1,000,000 lbs. in 1907; 1,350,000 lbs. in 1908; 25,000 tons of 5% ore shipped and 45,000 tons sent to cementation plant in 1909. Ore reserves estimated Dec., 1909, 1,449,000 tons.

HUELVA; SOCIÉTÉ FRANÇAISE DES PYRITES DE.**SPAIN**

Office: Rue de Chateaudun 28, Paris, France. Mine office: Valdellamusa, Huelva, Spain. Albert Faraud, gen. mgr.; Victor Prévost, mgr.; Chas. Marchal, asst. mgr.; P. Truchet, metallurgist. Organized Dec., 1899, under laws of France, capitalization f3,500,000, later increased to f6,000,000, as successor of Société Française des Mines de Cuivre d'Agua Tenidas. Company owns the Confesonarios mines at Valdellamusa, the Perrunal and other mines at Cortegana, and El Lomero and Poyatos mines at El Cerro, all mined for pyrite, low in copper tenor but averaging about 48% sulphur and sold to acid works, the copper being afterwards recovered in leaching plants.

The Perrunal mine, at Cortegana, has an orebody between quartz-porphry, and argillaceous metamorphic rocks, with quartz veins following the planes of stratification.

El Lomero mine, at El Cerro, 6 kilometers east of Valdelamusa, 24 hectares, was opened 1877, and has been under development since it was taken over by this company in 1907. The property shows a gossan of 2 to 3 meters width, for about 300 meters length, and carries cupriferous pyrite, assaying about 1% copper. Development is by a 108-meter tunnel, with 3 levels opened.

Production of ore has been as follows: 13,480 metric tons in 1901; 157,821 metric tons ore and 13 tons cement copper in 1904; 154,394 tons in 1905; 194,769 tons in 1906; 239,400 tons in 1908; about 220,000 tons in 1909 and 236,000 metric tons in 1910, yielding a net profit of \$901,271. Production of copper is estimated as follows: 275,000 lbs. in 1901; 3,000,000 lbs. in 1905; 4,000,000 lbs. in 1906; 4,500,000 lbs. in 1907; 4,250,000 lbs. in 1908, and 4,750,000 lbs. in 1909. As the entire output is sold for its sulphur content and no record made of the copper which the buyers recover from the ore after it is burned for sulphuric acid manufacture, the copper production of the mine cannot be given. Mine considered valuable, with good prospects of future increase in production.

HUESO; FUNDICION EL.

CHILE

Owned by José Ramón Espinoza, at Pedegua, Petorca, Aconcagua, Chile.

HUILLCA; SOCIEDAD MINERA LA.

PERU

Mine office: Morococha, Junín, Peru. Organized 1892, under laws of Peru. Owns a group of 3 pertenencias (7 acres), including La Huillca and La Vieja mines, yielding ore averaging about 8.5% copper and 900 grams silver per metric ton. Production was 166,491 lbs. fine copper in 1904; 598,548 lbs. in 1905; 1,192,468 lbs. in 1906; 444,116 lbs. copper and 2,133 kgs. silver in 1907.

HUINAC CONSOLIDATED COPPER, LTD.

PERU

Secretary and office: W. M. Jew, 4 Lloyds Avenue, London, E. C., England. G. M. Chrussachi, W. Warren and L. Clerc, directors. Organized June 19, 1912, capitalization £400,000, shares £1 par. Company is a reorganization of the Huinac Copper Mines, Ltd.

Owns silver-copper properties covering nearly 2 sq. miles at Huaraz, Ancachs province, north of Lima, Peru; also claims aggregating 256 hectares, 30 miles from the port of Culebra, including the Montana de la Plata mine, carrying argentiferous copper ore, and extensive anthracite coal lands, 15 miles from the copper mine. A smelter, of 30 metric tons daily capacity, was blown in, 1908. Property reported on by W. Warren.

HUINAC COPPER MINES, LTD.

PERU

Wound up by court, 1911. Succeeded by Huinac Consolidated Copper Co., Ltd.

HUSA; AKTIEBOLAGET GRUFVOR.

SWEDEN

Is Swedish holding company for the Duluth-Husa Copper Mines Co.

IIMORI MINE.

JAPAN

Mine office: Ozu-mura, Naka-gori, Kii, Japan. Tanezo Nakaye, owner and manager. This is a pyrite mine whose copper production is a byproduct. The mine has only a small steam plant, most of the stoping being done by hand work and the production of iron pyrite varying greatly with the demand from year to year. The mine yielded 22,586 tons of iron pyrite in 1912, which is almost the exact production of 1907 and nearly 10 times that of 1908, while copper production has been nearly constant, being 141,338 lbs. fine copper in 1911.

IKUNO MINE.

See Mitsu Bishi Goshi-Kwaisha.

JAPAN**ILLAPEL SMELTER.**

See Geisse Hermanos, at Illapel, Coquimbo, Chile.

CHILE**ILUSION; MINA LA.****CHILE**

Idle. Mine at Talcuna, La Serena, Coquimbo, Chile. Victor Illanes, owner and manager. Property, 16 kilometers from Marquesa railway station, shows a vein of about 12' average width. Produced about 400 metric tons of ore, of about 9% average copper tenor some years ago.

INARI MINE.**JAPAN**

Mampeï Imamura, owner, Nishi-Usuki-Gori, Miyazaki, Japan. Production has been practically constant, averaging 100,000 lbs. copper a year since 1908. Output for 1911 was 106,724 lbs. copper and for 1912 was 97,416 lbs. Employs 60 persons and had 16-h. p. power plant in 1911.

INCA DE ORO i COBRE DE COPIAPÓ; COMPAÑIA MINERA**CHILE**

Office: Iquique, Chile. Mine office: Copiapó, Atacama, Chile. Organized Dec. 14, 1906, under laws of Chile, capitalization £30,000, shares £1 par. Property, apparently of promise, was a small producer at last accounts.

INCA COPPER SYNDICATE (ENGLAND).**PERU**

Liquidated, June, 1911.

INCAORO MINING CO., LTD.**PERU**

David G. Bricker, New York City, president. Mine at Yani, Peru. Property shows fissure veins in andesitic rocks carrying rich silver-copper ores. Extensive development work is now in progress and company was installing a power plant, compressor, etc., in Aug., 1913.

INCIENSO; MINA EL.**CHILE**

Mine near Sotaquí, Ovalle, Coquimbo, Chile. Lands, 300 hectares $2\frac{1}{2}$ miles from Panulcillo. The claims show a series of veins of 2 to 5 meters aggregate width, carrying sulphide ore, with gangue of limestone, iron and quartz, developed by tunnels of about 700 meters aggregate length, connected by winzes. Ore is concentrated in a mill of 150 metric tons daily capacity. Production, 1908, was 675,000 lbs. fine copper.

INIGUEZ; CARLOS VERGARA.**CHILE**

Idle. Office, mine and works: Petorca, Aconcagua, Chile. Lands include El Mauro mine, opened 1860, which has copper ore carrying considerable values in gold and silver. The smelter, known as the Fundición El Mauro, 38 kilometers from Los Vilos, the nearest port, has been idle several years. Production was 200,000 lbs. fine copper in 1903, but shrunk to 24,104 lbs. in 1906, and to 14,021 lbs. in 1907.

INNAI MINE.**JAPAN**

See Furukawa Mining Co.

INSIZWA NICKEL & COPPER DEVELOPING CO., LTD.**CAPE PROVINCE**

Office: Mount Ayliff, Cape Province. Mine office: Kokstad, Griqualand East, Cape Province. Wilfred Vernon Parsons, secretary. Organized March, 1908, under laws of Cape Province, capitalization £200,000, shares £1 par. Lands are 2 mining areas, formerly held by South Namaqua Syndicate, showing ore disseminated through norite, occasionally occurring as lenticular masses of considerable size in norite, with a shale contact. Property is a disseminated nickel deposit; the secondary enriched ores carry nickel, copper and from $\frac{1}{2}$ to $\frac{1}{4}$ dwt. platinum with 7 to 12 grains gold and $\frac{1}{2}$ oz. silver.

INTERNATIONAL COPPER CO., LTD.**ARGENTINA**

Secretary and offices: A. Dangerfield, 56 Cannon St., London, E. C.,

England. Mine office: Chilecito, Rioja, Argentina. Capt. W. B. McTaggart, D. L., J. P., chairman; H. J. Meyerstein, T. Buck, C. Lowther, M. P. and W. Parker, directors. Organized July 7, 1905, under laws of Great Britain, capitalization £100,000, shares £1 par; issued, £97,495. Was formed to finance the Famatina Development Corporation, Ltd., buying £20,000 debentures and £20,000 income bonds of that company, and agreeing to advance £60,000 additional, at 6% for the erection of a smelter, if required, securing in return the right to act as exclusive agent for sale of the Famatina Co's. copper, at 2% commission. These terms have been canceled and company's sole interest is now 323,055 fully paid shares in the Famatina Co.; 100,000 under option at 4s. per share; 50,000 at 6s. per share to Dec., 1913. Bonds issued 4,000, of £10 each, 8% interest. Interest unpaid since Nov., 1909. Accounts for 2 years to Dec. 31, 1911, show a loss to date of £95,501.

IRISH MINES PROPRIETARY CO., LTD.

IRELAND

Office: 4 Dawson St., Dublin, Ireland. Mine in Bonmahon, Waterford Co., Ireland. Organized Aug. 2, 1906, under laws of Ireland, capitalization £20,000, in 10,000 ordinary shares, £1 par, and 100,000 deferred shares, 2s. par. No returns obtained.

IRVINEBANK MINING CO., LTD.

QUEENSLAND

Office: 18 Bridge St., Sydney, N. S. W., Irvinebank, Queensland, Australia. Mine at Klondyke, via Mungana, Lynd Co., Queensland, Australia. Geo. C. Young, sec.; Dan Mackey, mine mgr. Company employs about 700 men and was engaged in copper mining on a small scale. Property includes the Linedale West Chillagoe and the Lamington copper mines, latter having a 180' shaft, with steam hoist, mine having a 12" vein averaging 20% copper and 5 to 6 dwt. gold per long ton.

Company has mined no copper ores for some years, but has produced wolfram with small amounts of bismuth, molybdenite and silver-lead ores, smelting the 4 first named in its own plant.

The smelter has a water-jacket blast furnace, planned for treatment of both copper and silver-lead ores, and also for the accumulation of tin slag.

ITALIANA; SOCIETA' METALLURGICA.

ITALY

Office: Leghorn, Italy. Selling agency: Foro Bonaparte 37, Milan, Italy. Organized 1887, under laws of Italy, capitalization increased to 10,000,000 lire and later to 17,000,000 lire. Net profits were 641,067 lire with a 7½% dividend in 1904 and profits were 1,577,816 lire with an 8% dividend in 1912. Property includes 5 plants, the largest at Leghorn, with smaller plants at Limestone, Limestone Pistoiese, Bandalone Pistoiese and Donnatz in the Val d'Aosta.

The plant at Leghorn, occupying a site of about 25 acres, includes a smelter having 4 blast furnaces, of about 70 tons aggregate daily capacity, and 4 reverberatory furnaces, casting refined copper as anodes, plates, ingots, etc. The smelter treats about 20,000 tons of ore yearly, partly native, but largely imported from Spain, America and elsewhere.

The electrolytic refinery, built 1900, in connection with the Leghorn smelter, turns out copper of very great purity.

The power plant of the works has 16 engines, with about 1,800 aggregate h. p., and a very complete electric plant, furnishing power, light and energy for the electrolytic refinery. The shops are extensive, including rolling mills, tube mills, wire-drawing shops, wire-rope shops and miscellaneous shops for the manufacture of copper into a great variety of forms. There is a special alloy foundry having 48 crucible furnaces for fusion of the principal copper alloys, the products of these works enjoying an excellent reputation. There also is an extensive plant for the manufacture of

sulphuric acid. The company turns out nearly 16,000 metric tons of manufactured copper yearly, in almost an infinite variety of forms, and employs about 2,300 men.

JAMAICA CONSOLIDATED COPPER CO.

JAMAICA

W. S. Baker, vice-pres. and mgr., room 506, No. 84 State St., Boston, Mass. Mine office: May Pen, Clarendon, Jamaica. Thomas A. Casey, pres.; Otis W. Swan, sec.-treas.; Cyril Abraham, supt. Organized Sept., 1907, under laws of Maine, capitalization \$6,000,000, shares \$1 par.

Property, 2,276 acres, 15 miles from the coast, in the Clarendon hills. The Congo Hill mine has a 455' tunnel showing a small vein carrying chalcopryite and bornite. The Copper Wood mine has a 270' tunnel showing a small stringer of bornite. The Sylvia mine has a 75' tunnel showing bornite and chalcocite, said to assay 7% copper. The Elma mine has a 240' tunnel and the Iva mine has a 90' tunnel. Company reports more than 8,000' of underground workings. Small ore shipments were made from this property, 1854-1857.

Ore contains cuprite, malachite, azurite, chrysocolla, chalcopryite, bornite and chalcocite. The central mountain range of Jamaica contains many old copper mines and most of them still show ore, but not in large enough amounts to be attractive. This company's past record is not above criticism, and has been fully discussed, Vol. X. At present no company has copper mines in the island of Jamaica having sufficient ore in sight to warrant more than the statement that they are worth developing.

JIRO SATO.

JAPAN

Owens the Uneкура mine in Iwate, Japan, employing 222 persons, equipped with 20-h. p. plant and producing 198,964 lbs. copper, valued at \$21,773 in 1911 and 208,712 lbs. in 1912.

JOSÉ BRUNO GONZALEZ JULIO.

CHILE

Idle. Mine office: Cajon de Maipó, Victoria, Santiago, Chile. Lands, known as Poderosa group, are a short distance from holdings of the Compañía Minera de Maipó, and have a parallel vein of the same general character. The copper ores carry cobalt and are different of treatment and production was small at last accounts.

JOYA MINE; LA.

SPAIN

Office: Huelva, Spain. Mine office: El Cerro, Huelva, Spain. Owned by Sucesión Vázquez López. Lands are 9 concessions, 53 hectares, near El Cerro, carrying the Levante, Poniente, Norte and San Rafael lodes. Mines were opened in ancient days by superficial workings whence the richest ores were extracted. Property shows considerable quantities of cupriferous pyrite, said to average about 48% in sulphur. The Poniente and Norte mines are opened by tunnels, on different levels. A 15-kilometer railway, to connect the mines with the Zafra y Huelva mine, was under construction, 1910, as the mine experienced great difficulties in exploitation owing to lack of adequate transportation facilities. Production was 5,000 metric tons of slightly cupriferous ore in 1908. The mine was said, 1911, to have about 300,000 metric tons of washed sulphur ore ready for export as soon as adequate transportation facilities are furnished. Property considered promising. No recent returns secured.

JUKES PROPRIETARY MINES.

TASMANIA

Idle. Mine office: Crotty, Franklin Co., Tasmania. Walter Donath, mine manager, at last accounts. Mine in the vicinity of Crotty, with a wagon-road connecting therewith, is developing by tunnel and it is planned working this property in connection with the Lake Jukes mine. There are several small mine buildings.

JULIA COPPER MINING SYNDICATE, LTD.**SPAIN**

Dissolved Sept., 1912. Formerly at Fregeneda, Spain. Described Vol. X.

JUNTA KOIDE.**JAPAN**

Owens the Mochikura mine in Niigata, which employs 206 persons, has 28-h. p. power plant and produced 473,237 lbs. copper, realizing \$53,461 in 1911 and 764,475 lbs. fine copper in 1912.

KAFUE COPPER DEVELOPMENT CO., LTD.**RHODESIA**

Secretary and office: T. Donald, Salisbury House, London, E. C., England. African agents, Bechuanaland Exploration Co., Ltd, Bulawayo, Rhodesia. Mine office: Silver King, Northern Rhodesia. Herbert L. Stokes, chairman; Thos. J. Seel and A. H. Edenborough, directors. Organized May 31, 1905, under laws of Great Britain, capitalization £350,000, shares £1 par; issued, £250,007, fully paid.

Company is controlled by Northern Copper (B. S. A.) Co., Ltd., and Rhodesia Copper Co., Ltd., all 3 having the same officers.

Company acquired from the Northern Copper (B. S. A.) Co., Ltd., a block of mining claims covering 30 sq. miles, 15 miles south of the Kafue river, and including the Silver King, Sable Antelope, Kakuya, North Star, Maurice Gifford, Crystal Jacket, Blue Jacket and True Blue mines. Also the Hippo mining property of 160 claims, and 2 farms (Hippo) comprising 6,000 acres, on the Kafue river, about 145 miles west of Rhodesia Broken Hill. The Hippo mine, though promising, is in the tsetse fly country and development has been stopped.

The principal copper deposits, so far located, are either those of old native workings or near them, occurring in a belt of limestone about 10 miles wide, that runs nearly north and south for a long distance. This limestone belt is flanked and sometimes intruded by talcose, quartzose and micaceous schists, and by granite and quartz porphyries. The copper occurs as irregular deposits in limestone and in veins traversing schists, the predominant ores being tetrahedrite and chalcocite, with occasional bornite and chalcopyrite oxidized near the surface, the ores in schists being more highly oxidized than those in limestone.

The mine has a 99' shaft showing from a depth of 34 to 99' a vein of 4' 8" estimated average width, carrying ore claimed to average 21.36% copper and 2.4 to 13 dwts. gold per long ton. There also was a second shaft of 100' which developed nothing of especial promise.

The main camp is at the Silver King mine, in latitude 14° 36' 11" south, and longitude 26° 55' east, 12 miles south of the northerly reach of the Kafue river. The main shaft of the Silver King mine is 205' deep, and the orebody, apparently a lens, pinched out before the bottom of the shaft was reached, and the developed ore is now exhausted.

At the Sable Antelope mine, the high-grade ore is also worked out and the 25-ton smelter, erected at the mine in 1911, is idle after a year's operation and the production of 1,830 tons of 72% matte. The Crystal Jacket mine and True Blue mine were worked in a small way in 1912-13, but have been idle since Feb., 1913, owing to heavy working costs, high railway rates and the royalty exacted by the British South Africa Co.

Production of the Kafue Co. for 1912 was 2,253 tons of metallic copper and matte according to the published report of the Northern Copper Co.; 1913 production amounts to 129 tons, or a total to date of 946 tons shipped, of which 605 tons were sold for £36,738. Copper matte on hand and in transit amounted to 1,307 tons, Sept., 1913.

KAFVELTORPS KOPPARVERK.**SWEDEN**

Idle. Mine address: Kopparberg, Orebro Län, Sweden. Mine has

argentiferous copper and lead sulphides, with values mainly in copper. Production was 112,590 kgs. of 72% copper matte, and 16,423 kgs. fine copper, giving net production of 214,919 lbs. fine copper in 1901, besides lead and silver contents.

KAJITANI MINE.**JAPAN**

Idle. Address: Wataro Shiraishi, owner, Oboki-mura, Niigori, Iyo, Japan. Mine has no power installation. Employed an average force of 73 persons, and produced 23,508 tons of copper ore in 1911, valued at 14,723 yen.

KALATINSKY MINE.**RUSSIA**

Located in upper Isset district. Produces cupriferous pyrite carrying 2 to 3% copper, treated in smelter erected 1912.

KALKADOON MINE.**QUEENSLAND**

Address: Arthur Powell, mine superintendent, Mt. Cuthbert, Queensland, Australia. Owned by Mount Cuthbert Co., and described under that title.

KAMAISHI MINE.**JAPAN**

Address: Chobei Tanaka, owner, Kamigo, Iwate, Rikuchu, Japan. The principal property is an iron mine, but there also is a small mine of argentiferous copper ore. Production was 56,777 lbs. fine copper and 39,733 metric tons of iron ore in 1907, increased to 1,591,635 lbs. copper with \$13,788 gold and \$13,548 silver in 1911 and 1,341,403 lbs. fine copper in 1912.

KAMBOVE COPPER MINE.**BELGIAN CONGO**

Owned by Union Minière du Haut Katanga, a subsidiary of Tanganyika Concessions, Ltd.

KAMIOKA MINE.**JAPAN**

See Mitsu Bishi Goshi Kwaisha.

KANGAIRA MINES, LTD.**NEW SOUTH WALES**

Mine office: Yass, King Co., N. S. W., Australia. Chas. Taylor, managing director. Organized 1908, under laws of New South Wales, capitalization £50,000, shares 10s. par. Report at annual meeting March, 1913, for 9 months' operations, showed £6,896 profit. Directors wrote off £2,896 for development redemption, £1,000 as depreciation on plant and declared a dividend of £461 on the 10% cumulative shares.

Lands are in the Lachlan district, about one-half mile from the Burrowa river. Management was said, 1909, to plan a 10-mile private railway to Binalong, the nearest rail station.

Mine, discovered 1899, and opened July, 1902, has a 5' vein, developed by a 284' shaft with extensive drifts on the vein. The ore is 1½ to 3' wide and contains chalcopryite, galena and sphalerite, assaying 5 to 8% copper, 5 to 30% lead, up to 3% zinc, 10 to 20 oz. silver and 5 to 12 dwts. gold per long ton.

Company has a small concentrator and ore raised is hand-sorted and the reject concentrated. Production goes to the Port Kembla works. In 1909 management shipped 210 tons of copper-lead ore, known as middlings, to London, that averaged 4.43% copper, 33% lead, 18 oz. silver and 2.5 dwts. gold per long ton. Production, 100 tons weekly, furnishing about 10 to 15 tons of first-class ore and 25 tons of concentrates. Property considered promising.

KAN-HSIEN MINE.**CHINA**

Mine office: Kan-Hsien, Kiang-Hsi, China. Is a government mine, worked under the empire by the provincial governors to supply the local mints. Development was begun 1907, a fund of 400,000 taels having been furnished for the purpose, in equal amounts by the provinces of Kiang-Hsi and Kiang-Su.

KANMANTOO COPPER MINES.**SOUTH AUSTRALIA**

Address: Kanmantoo, via Callington, South Australia. Owned by an Adelaide syndicate, formed in 1912. Received a government subsidy, 1912.

Property has 5 north-south quartz veins and 1 cross vein in schist. The Emily vein is opened by a 120' shaft (80' vertical and 40' on the dip) with a second shaft connected with it on the 65' level. An old stope 10 to 20' wide and 50' long, shows seams and bunches of chalcopryrite in schist and quartz. Samples by the government inspector, examining the property preliminary to government aid, showed 8.8% copper with \$1 to \$2 in gold and silver values. The 4 other veins show similar ore.

KANO MINING CO.**JAPAN**

Mine address: Kano-mura, Yama-gori, Iwashiro, Japan. Mine, known as the Kano, carries gold and silver-bearing copper ore. Employs 1,552 men and has steam-power equipment of 1,072-h. p. with 890-kw. electric power. Production, which was 2,000,000 lbs. in 1908, dropped to 1,633,184 lbs. fine copper in 1911, but company also produced 2,312 metric tons of zinc, a little pig lead valued at \$417 and gold and silver to the value of \$104,288.

KAPSAN CONCESSIONS, LTD.**KOREA**

Address: 418 First Nat'l Bank Bldg., Denver, Colo. Company is an offshoot of the Colbrann-Bostwick Development Co., which will be registered in London in 1914. Property consists of 4,000 square miles in N. E. Korea, in the Ham Kyeng province, and includes the Kapsan copper mine, which has been steadily developed since June, 1908, and now has reserves of 168,500 tons of 10.54% copper ore. The deposit is a mixture of chalcopryrite, pyrrhotite and a small amount of arsenopyrite, forming a hard, clean and massive ore devoid of alteration or enrichment. This ore occurs in an irregular lens, probably a replacement deposit in altered Paleozoic limestone.

KAPUNDA MINES, N. L.**SOUTH AUSTRALIA**

Mine near Kapunda, Light Co., South Australia. F. C. Howard, chairman, and David James, M. P., directors. Troubles over title are said to have been settled.

The mine, 44 miles north of Adelaide, was opened 1843, and has been worked by leasers during many years. Fully described Vol. X.

KARA BAIR MINE.**BULGARIA**

Mine, situated about 10 miles southwest of the seaport of Burgas, has several veins 1 to 6' thick, in andesite, which carry complex copper-lead-zinc ores with bornite, chalcopryrite, galena blende and pyrite in a quartzose gangue.

KARGALINSKI WORKS.**RUSSIA**

Office and works: Orenburg, Russia. W. A. Pashkoff, owner; E. O. Ternor, manager, at last accounts. Lands, 24 miles from Orenburg, include 13 different mines having 28 shallow shafts, some from prehistoric times, ore averaging about 3% copper. Equipment includes steam and gas power. Forces averaged 242 men underground and 93 on surface and production was 975,210 pounds of copper ore in 1909, estimated to have yielded about 900,000 lbs. fine copper. No recent returns secured.

KATANGA; COMPAGNIE DU.**BELGIAN CONGO**

Office: 48 Rue de Namur, Brussels, Belgium. Mine at Katanga, Belgian Congo. Baron Lambert, pres.; Col. Albert Thys, managing director; Baron Constant Goffinet, Georges de Laveleye, Alexandre Delcommune, Count John d'Oultremont, Maurice Bunau-Varilla, H. Monnom, J. de Hempinne, E. Francqui and P. Golmick, directors; A. J. Wauters, sec.; L. Goffin, and G. Périer, mgrs. Organized April 15, 1901, under laws of Belgium, as

a subsidiary of the Belgian Congo Co., capitalization f3,000,000, in f3,000,000 preferred stock, shares f500 par, and 18,000 ordinary shares without assigned value.

Lands, 160,000 sq. miles, freehold, with various preferential mining and railway concessions. Principal mining holdings comprise the Katanga, Kazemba and Pala mines, located on the upper bank of the Lualaba river, showing gold-copper ores.

This corporation is primarily a land and holding company, and its mineral properties are being developed by a number of other corporations, mainly subsidiary or collateral, these including the following companies: The Comité Spécial du Katanga, organized 1900, one-third of the capital subscribed by this company, and two-thirds by the late Congo Free State. This company is developing copper properties at Katanga, and is practically a go-between for this company and its other subsidiaries, the Compagnie du Lomami, organized 1898, which is developing mining properties on the Lomami river; the Union Minière du Haut Katanga, which is separately described in this work; the Société Anonyme de Recherches Minière du Bakat and the Société Industrielle et Minière du Katanga, which also is engaged in general exploratory work; the Compagnie Géologique et Minière des Ingénieurs et Industriels Belges, which likewise is doing general exploratory work; the Société Belge Katanga, which is prospecting for minerals and also has trade concessions; the Société Commerciale et Minière du Congo, which also is prospecting, and holds similar trading concessions; and the Anglo-Belgian Co., which holds a concession from this corporation, is engaged in trade only, and has no mining concessions.

In Feb., 1911, credit balance was 378,448 frs., the year's profit being 69,287 frs.

KAWAIAYAMA MINE.

JAPAN

Mine in Yamaguchi, Japan, has narrow veins averaging 2 to 4' in thickness traversing amphibolite schist and containing pyritic ore carrying chalcopryrite that assays about 4% copper. Production increased from 14,834 lbs. in 1900 to 86,395 lbs. copper in 1908, declining to about 55,000 lbs. valued at \$7,888 in 1911.

KAWAU MINE.

NEW ZEALAND

Located on Kawanui island, Rodney county, in Hauraki gulf, on the east coast, about 30 miles north of Auckland. Is an old mine worked in 1842 and re-opened in 1900, showing a strong quartz vein running northeast and southwest and dipping steeply, carrying chalcopryrite mixed with pyrite, mined by a shaft sunk below high water mark in the footwall of the vein.

KEDABEG MINING & REDUCTION WORKS

RUSSIA

Owned by Siemens Estate. See Siemens Copper Works.

KEF-OU-M-THEBOUL MINE.

ALGERIA

Idle. Owned by Société du Syndicat Minier.

KENNEDY MINE.

QUEENSLAND

Owned and operated by Queensland Copper Co., Australia.

KHAN KUPFERGRUBE, LTD.

GERMAN S. W. AFRICA

Address: C. Heckmann Aktien-Gesellschaft, Duisburg a. Rhein, Germany. Mine office: Arundis, German S. W. Africa. Erwin Lachmund, general manager. Organized about 1910, capitalization 1,000,000 marks, or \$239,000, of which 761,100 marks went to C. Heckman for his lease of the property from the Deutsche Kolonial Gesellschaft and 240,000 marks for promotion profits. Property embraces 10 claims of 10 hectares on which the company has not the right to extract gold or silver ores or diamonds.

Property includes the Khan copper mine, situated near Arundis, and

connected by a private railway line with the Swankopmund & Karibib railroad. Development is by 500' shaft in which the work has shown enough ore in sight to warrant the building of a 50-ton concentrator. This concentrator, now in course of construction, will be run by electric power and supplied with water from a pumping plant on the Khan river, 11 miles distant. Property has been developing for 3 years and has now reached the producing stage.

KICHIZAYEMON SUMITOMO.**JAPAN**

Described under Sumitomo Copper Co. Owns the Besshi and Nishinokawa mines.

KILLINGDAL KOBBERVAERK.**NORWAY**

Operated under lease by Bede Metal & Chemical Co.

KIRKEBY KOBBERGRUBER.**NORWAY**

Presumably idle. Office: Carl Johansgade 23-IV, Christiania, Norway. Mine at Hakedal, Christiania, Norway. Olaf Sandaas, mgr.; F. R. Bentzen, supt., at last accounts. Property about 10 kilometers from Hakedal, shows numerous parallel veins, with cross-fissures, carrying a sulphide complex of chalcopyrite, galena, sphalerite and pyrite, with quartz gangue.

KISHORN MINE.**SCOTLAND**

Idle. Office and mine: care Mrs. M. M. H. Stewart, owner, Kishorn, Loch Carron, Rosshire, Scotland. Mine was worked about the close of the eighteenth or opening of the nineteenth century.

KJÖLI KOBBERGRUBER.**NORWAY**

Idle. Mine at Reitan, Aalen, Guldalen, Trondhjem, Norway. Tönne Huitfeldt, owner. Property formerly owned by Kjöli Mines, Ltd. Mine said to have 10-mile aerial tram. Production, 1905, was 27,000 metric tons of cupriferous pyrite.

**KLINGENTHAL-GRASLITZER KUPFERBERGBAU;
GEWERKSCHAFT.****GERMANY**

Mine office: Klingenthal, Saxony, Germany. Erhardt August Scheidt, mgr.; Herr Goring, Richard Keil, C. L. Birk and Gerh. Becker, executive committee; E. von Baczko, mgr.; Herr Utsch, supt. Capitalization 1,000 shares, without assigned value. Employs about 300 men.

The output is handled through the 321' Erhardt-August shaft, and the Helene shaft of the Kupferhübel, the ore consisting of low-grade copper-bearing pyrite. The company also operates the St. Peter Fundgrube.

The plant includes ore-dressing works and a smelter near Barby. The company issued bonds of 2,000,000 marks for the purpose of building a sulphuric acid plant and a new smelter.

KLONDYKE COPPER MINES, N. L.**QUEENSLAND**

Address: care C. N. Clarke, Chillagoe, Queensland, Australia. Organized Feb., 1913, capitalization £12,000, shares £1 par; 3,000 issued to vendor. Owns 30 acres, 5 leases, in Klondyke district, Chillagoe, with favorable copper showings, some miles from the Mammoth Copper Mines smelter at Cardross, near Mungana.

KNOCKMAHON MINES.**IRELAND**

Owned by Bonmahon Copper Mines Development Syndicate, Ltd.

KOKAND COPPER MINES.**RUSSIAN TURKESTAN**

See Novikoff Co.; also Nasaroff & Co. Mines near Naukat. Geology described in Mining Magazine, Dec., 1912, p. 444.

KOKUSEI MINE.**JAPAN**

Main office: Suyuki kogyo honten, Higashiku-bingomach, No. 60, Osaka, Japan. Mine office: Kokusei Mine, Mimasaka katsutagun Kawabemura, Japan. Ekiji Suzuki, owner; Z. Mizunoya, gen. mgr.

Is a small mine, having an ore deposit 840' wide, 1,500' long and proven

to depth of 312'. Ore consists of massive pyrite, with chalcopyrite, chalcite and a little zinc blende occurring in lenticular masses, the largest 60x80' encased in serpentine-like material between clay-slates and igneous tuffs. The surrounding rocks include sandstone and serpentinized igneous rocks. Property has 2 shafts, 168' and 138', respectively, with 12,765' of underground working. Mine was discovered 1878, opened 1882, closed 1909, and reopened 1912. Property is 6 miles from the Samyo & Chugoku railway. Production 1912, 524 tons, at an average mining cost of 14.73 yen and a smelting cost of 4.59 yen. Production of fine copper, 66,000 lbs. Smelter has daily capacity of 75 tons and is located at Bicchu, Japan.

KOMAKI MINE.**JAPAN**

Owned by Mitsu Bishi Goshi-Kwaisha.

KOSAKA MINE.**JAPAN**

Owned by Fujita & Co., at Kosaka, Akita, Japan.

KOUNDOUROVY FRÈRES; A. & G.**RUSSIA**

Address: Poste de Katar, Elisavetpol, Russia. Production, 1912, was 216,000 lbs. copper compared with 1,224,000 lbs. in 1911.

KRISTIANIA MINEKOMPANI.**NORWAY**

Idle. Office: Christiania, Norway. Mine near Skafsasogn, Telemarken, Christiansand, Norway. Property is the Bandakslid Kobbergruber at Skafsas, and the Goli Kobbergruber at Sauland. Company also owns copper claims at Kviteseid.

KRISTIANSSANDS NIKKELRAFFINERINGSVERK.**NORWAY**

Address: Christiania, Norway. Is a smelting and refining company treating copper and nickel mattes, carrying 6 to 8% of these 2 metals combined. The converting plant is the only 1 in the world in which this low-grade matte is bessemerized and 75% metal made.

KUNE MINE.**JAPAN**

Owned by Furukawa Mining Co.

KUNJAS COPPER MINES.**GERMAN S. W. AFRICA**

Near Lüderitzbucht, German S. W. Africa. Owned by Deutsche Kolonialgesellschaft. Veins are on the Kunjas farm, near Lüderitzbucht, within the Territories Concessions, about 60 miles from the Seeheim-Kalkfontein railway line.

KUPFERBERG; GEWERKSCHAFT.**GERMANY**

Mine office: Kreuzberg, Rheinprovinz, Germany. Julius August Böhm, chairman; Emil Guillaume, Otto Haagmann, Otto Langhorst and Gustav Hoffmann, executive committee. Organized under laws of Germany, capitalization 3,000,000 marks, shares 3,000 marks par. Bonds, 1,000,000 marks, at 4½%. Employs about 180 men. Property, carrying copper ore, near Wippföhrth, includes the Danielszug mine, on which development was begun 1903. Management plans further development and the installation of a new boiler plant, air compressor and concentrator. No report for 1912.

KUPFERPLATTE; KUPFERKIESBERGBAU.**AUSTRIA**

Mine office: Kitzbühel, Tyrol, Austria. Property is an ancient mine, carrying bedded deposits of chalcopyrite, with quartz gangue, in Silurian slates. Mine was a small producer in 1905. Idle.

KUSAKURA MINE.**JAPAN**

See Furukawa Mining Co.

KYLOE COPPER MINES, N. L.**NEW SOUTH WALES**

Secretary and office: R. D. Hartwell, Vickery's Chambers, 82 Pitt st., Sydney, N. S. W., Australia. Mine office: Adaminaby, Wallace Co., N. S. W., Australia. J. W. Ashcroft, chairman; Dr. H. C. Taylor Young, A. G. de Lauret and J. T. Toohey, directors; A. J. Dunstan, gen. mgr. For fiscal year ending July 31, 1910, company paid a 10% dividend of £1,000 on pre-

ferred shares, and 2 interim dividends of 6d. each on preference and ordinary shares, giving total dividends of £7,000, and paid a 6d. interim dividend of £3,000 July 30, 1910.

The company's report for the year ending June 29, 1912, shows: Expenditures, £522 19s. additional, or a total of £15,936 for plant and machinery; balance to be carried forward as profit and loss, £6,753; net profit, after allowing £3,984 for depreciation, £1,489, which, with previous credit balance, totals £8,543.

The mine, 3 miles from Adaminaby and 30 miles from Cooma, the nearest rail point, was discovered 1860, and a little ore was extracted from time to time until taken over, 1904, by Schafer Bros., who shipped about 500 long tons of ore, returning 11 to 25% copper, to the Waratah smelter, 1904-07. The ore occurs in a vein of 30" to 6' width, in quartz felsite, passing into aplitic and biotitic granite in the lower levels. The oxidized zone carried rich malachite, azurite and cuprite, ores succeeded at depth of about 40' by quartz carrying chalcopryite with a little bornite and associated with pyrite, impregnations of chalcopryite in the granitic walls. The primary ore, of milling grade, averages about 4.5% copper. The picked ore carried 21.2% copper, 24.3% iron, 28.9% silica and 25% sulphur. The mine has a 410' main shaft, with levels at 120', 200', 300' and 400', opened for 700' in length.

The concentrator has a Krupp ball mill and jigs, treating ore averaging about 4.5% copper, and turns out concentrates of about 16% copper tenor. The froth flotation plant (Minerals Separation Co.) proved a success in 1912. Production for 1912 was 17,650 tons averaging 5.77% copper, yielding 884.43 tons of copper with an 86.81% recovery. The mill treated 16,948 tons of 5.543% ore in 286 days.

In May, 1913, the Kylvoe property was shut down and the directors of the company authorized to consider the acquisition of a new property.

KYOSAKU TAKED.

JAPAN

See Tsubaki Mine.

KYSHTIM CORPORATION, LTD.

RUSSIA

Office: 80 Bishopsgate, London, E. C., England. Operating office; Nevsky Prospect 1, St. Petersburg, Russia. Mine office: Kyshtim, Perm, Russia. C. F. H. Leslie, chairman; L. Urquhart, resident director; Baron Vladimir Meller-Zakomelsky, D. J. Morgan, T. B. Reynolds, S. Polak, A. J. H. Smith, F. Stobart, S. J. Blumlein, H. C. Hoover and R. Gilman Brown, directors; J. P. B. Webster, sec.; R. G. Brown, cons. mg. engr.: W. G. Perkins, cons. met. engr.: H. H. Knox, New York city, advisory cons. engr.

Organized Oct. 29, 1908, under laws of Great Britain, capitalization £1,260,000, shares £1 par; 1,002,800 issued and fully paid. Property is the entire share capital of the Kyshtim Mining Works, a corporation organized 1900, under the laws of Russia, of which Mr. Urquhart is managing director. Debentures authorized and issued, £650,000 at 6%, convertible into shares at £2 10s. per share, 260,000 shares being reserved for this purpose.

Lands, 2,198 sq. miles, or 1,406,700 acres, including iron mines, iron smelters and works, gold mines, copper mines and a copper smelter, the mineral lands covering about 189,000 acres, with 367,200 acres of farm and grazing lands and 850,500 acres of forest lands.

The company's copper and gold mines, in the Soymonovsk valley, about 30 miles from Kyshtim, include a number of copper mines, having lenticular orebodies of considerable size, and are connected with the Main Government railroad by the company's own narrow-gauge road. The principal mines are the Koniukhoff, Smirnoff, Tissoff and Americansky.

The ore reserves were estimated by R. Gilman Brown in Dec., 1912, to

be 2,369,000 long tons, the average being 3% copper, 0.1 oz. gold, and 1 oz. silver per ton. This figure includes only 296,000 tons in the Americansky mine, but since this report was made further development by 7 drill holes has shown the existence of a large orebody in this mine, the ore disclosed to date amounting to more than 700,000 tons, running higher than that of the other mines in both copper and precious metals.

The smelting plant at Karabash, built by Mr. Perkins, consists of 3 water-jacketed furnaces with a capacity of 360,000 tons of ore per annum; in addition, 2 open-hearth reverberatory furnaces are working on fines and flue dust, and a large reverberatory furnace to treat the fine ores is now being erected.

Production in 1912 amounted to 7,507 long tons (5,140 tons, 1911) of blister copper, all of it refined and the gold and silver recovered at the company's electrolytic works. The average net sale price realized in 1912 after paying selling expenses and freight was £96 per ton. (Note—The Russian import duty on copper is £33 per ton.) It is estimated that, with a London price of copper of £60 per ton, the copper department will show a profit, after crediting duty and gold and silver recovered, and debiting selling expenses, of more than £60 per ton refined copper. The output for 1913 is estimated at from 7,600 to 8,000 tons.

In addition to its copper mines and works, the company has 3 iron works on different parts of the estate, the iron plant at Kyshtim making bar iron, that at Niazepetrovsk making sheet iron, and that at Kasli, about 15 miles north of Kyshtim, making castings. The yearly output of iron sheets and castings amounts to 18,000 tons. The company's timber is also being exploited and in addition to providing for fuel and mining requirements, large quantities are sold under contract to the State and other railways. About 2,000 men are employed in all departments.

The company entered the dividend paying list in Dec., 1912, when an interim dividend of 5% free of income tax was paid; the final dividend for 1912 was declared June, 1913.

The copper deposits of the Koniukhoff and Smirnoff mines were first worked for the iron ore forming the gossan. As the workings were deepened, gold-bearing sulphide ores were found, whose copper content increased with depth and diamond drilling showed the existence of large orebodies at these 2 and the Amerikanski mine.

In 1913 the company was negotiating with the Sissert Mining Co. for the Gumeshevsky mines in the Urals.

LADOGA LAKE MINING & SMELTING CO., LTD. FINLAND

Office: Finsbury House, Blomfield St., London, E. C., Eng. Mine office: Pitkäranta, Viborg, Finland. Col. R. G. Sharman Crawford, chairman; H. T. Holmes, director; J. Sargent, sec. Organized March 2, 1908, under laws of Great Britain, capitalization £200,000, shares £1 par; issued, £111,000, of which £100,000 vendors' shares are fully paid, and 11,000 shares are 1s. paid. No recent financial report furnished. Company acquired from C. Cully the Pitkäranta estate with iron and copper mines, smelting works, plant, etc., situated in Impilaks parish, Finland, together with 3 steamers and 10 barges.

Lands, 10,000 acres, mainly well wooded, near Lake Ladoga, carrying iron and copper ores. The Pitkäranta mine, opened 1820, was worked steadily until 1903, making an average annual production of about 750,000 lbs. fine copper during the last decade of operation, and was under the ownership of the Russian Imperial Bank, 1894-1908.

The property carries several orebodies in Archæan rocks. The deposit under development is a granular mixture of augite, garnet and other ferro-

magnesian silicates, known as "skarn" that is shot through with chalcopyrite veinlets. This orebody is 15' thick, has a dip of 40° south, and has been opened at intervals for a length of about 1½ miles. To the eastward the ore occurs as bunches, up to several pounds in weight, and at this end of the workings the orebody is separated into 5 sections, the footwall bed carrying finely disseminated chalcopyrite overlaid by a 2 to 3' layer of barren material, followed in turn by 3' of barren schist, succeeded by a cupriferous bed of about 20" thickness carrying somewhat argentiferous copper sulphides. The company's lands also carry iron ore and are said to have indications of tin.

Company was inadequately financed, paying £175,000 for property with too small a working balance.

LADY FANNY COPPER SYNDICATE, LTD.

QUEENSLAND

Liquidated voluntarily, 1911.

LAKE COPPER PROPRIETARY CO., LTD.

SWEDEN

Office: 103 Cannon St., London, E. C., Eng. Col. A. H. C. Lynch-Staunton, chairman; M. Schreither, M. E., mine mgr., Vingnas. Lake Animinnen, S. W. Sweden; C. Maurice Champness, sec. Organized March 10, 1906, under laws of Great Britain, capitalization £300,000, in 298,000 ordinary shares of £1 par, and 40,000 deferred shares of 1s. par; issued. 255,000 ordinary shares and 40,000 deferred shares. Debentures, £500,000 6% bonds, of which £70,000 are outstanding. Holds lands through Lake Copper Syndicate Aktiebolag, organized under laws of Sweden.

Property, the Stora Strand and Vingnas mines, with 140 mining leases, 1,380 acres, 90 miles north of Gothenberg, Sweden. Orebody on the Stora Strand has been proved for 10 miles and to a depth of 800'. The mine has 13 shafts, 1 of 800' showing ores averaging about 2% copper with small values in gold and silver. At the Vingnas mine several veins are developed by 4 shafts, but no reserves are estimated. Ore in sight at the Stora mine is reported as 110,000 tons.

LAKE COPPER SYNDICATE AKTIEBOLAG.

SWEDEN

Is the Swedish incorporation of the Lake Copper Proprietary Co., Ltd.

LAKE GEORGE MINE.

NEW SOUTH WALES

Idle since 1907. Mine office: Bungendore, Murray Co., N. S. W., Aus. W. J. Channon and J. Plum, owners. Lands, 172 acres, freehold, at Captain's flat, Lake George, about 25 miles south of Bungendore. The mine, about 700' deep, was opened 1882, on a main vein of 22 to 30' width, having a N.-S. strike and vertical dip, in Silurian slates, ore occurring as replacements along fault lines, as a compact, fine-grained mixture of chalcopyrite, sphalerite, galena and pyrite, with aluminous quartzose gangue, carrying an average of about 1.5% copper with small gold and silver values.

The smelter has four 60-ton water jacket blast furnaces. Ore requires heavy fluxing and fuel charges. Pyritic smelting proved unsuccessful.

LALOKI COPPER MINE.

PAPUA

Address: care Great Fitzroy Mines, Ltd., Port Moresby, Papua, British New Guinea. Property is located 17 miles from Port Moresby and the local government is expected to build a railway line to Sapphire creek, 2 miles from the mine. The ore is a basic sulphide which carries 3 to 4% copper and \$2 gold per ton. Development includes a 140' shaft with a 74' level having 88' drifting on the vein. Property is a promising source of much needed pyritic ore for the smelter of the Great Fitzroy Mines, Ltd., in Queensland.

LAMBERT, C. J.; SUCESIÓN.

CHILE

Office, mine and works: La Compañía, La Serena, Coquimbo, Chile. Property includes El Brillador and San Antonio mines, 93 hectares, which

show fissure veins in porphyry, one of about 90' extreme width, with dip of 60°. Sulphide ores appear 100 meters below the outcrop and are said to average 5 to 10% copper. The Fortuna and Placeres mines employed about 150 men at last accounts. Los Bronces mine, formerly owned, was sold to Sociedad Minera de Los Bronces.

The reduction plant, 16 miles from Coquimbo, by railway, includes a 100-ton concentrator and a smelter, using the Welsh system, that was the first modern plant in Chile. This smelter, known as the Fundición La Compañía, has 2 calciners and four 21' reverberatory furnaces, treating ore averaging about 8%, with slags assaying 0.75% copper. Equipment includes two 100-h. p. boilers, two 80-h. p. engines and a small hydraulic turbine. Fuel is Australian coke, costing 20 pesos per ton, delivered. About 80 men are employed at average wages of 1.5 pesos daily. Production formerly was copper sulphate, consumed mainly by smelting plants using the Kröhnke process, but this business was lost, some years ago, and the smelter now produces Chile bars of about 95% copper tenor.

LAMPA MINING CO., LTD.

PERU

Secretary's address: Thos. S. Hancox, 411 Tower Bldg., Liverpool, Eng. Mine office: Santa Lucía Lampá, Puno, Peru. J. Lionel Barber, chairman; H. P. Gamon and S. Downs, directors; R. D. Barber, cons. engr. Organized June 30, 1906, under laws of Great Britain, capitalization £35,000, increased 1911, to £50,000, shares £1 par; issued, £23,280. Debentures, £25,000, authorized, at 7%; issued, £14,000. Lands, 34 hectares, including the Santa Catalina, Rubí, San Otto, San Carlos, Esmeralda and Socavón mines, also a power site, known as Trapiche, and the water power of Toropujani, near Santa Lucía. Ore reserves, 1912, were estimated at 24,000 tons of about 10% copper tenor.

LANGSFORD MINERAL CLAIM.

SOUTH AUSTRALIA

Copper prospect in Lovely gully, 8 miles from Wankaringa, South Australia. Property, formerly owned by the Laura Syndicate, is opened by several shallow shafts and open cuts, showing silicious ironstone carrying seams of copper ore, chiefly malachite, with small gold and silver values.

LAPILLA MINE (MINA LA LAPILLA).

SPAIN

Office and mine: Alosno, Huelva, Spain. Wm. Guthrie Bowie, manager. Property is a group of government concessions, with title standing in the name of Sr. D. Francisco Limón Pebollo, property being owned by a syndicate of local capitalists.

Lands, 100 hectares, in 3 groups, known as the Demasia Lapilla, Demasia Almagrera and Precaución, adjoining the Almagrera and Tharsis mines. Properties were exploited extensively by the ancients who left immense heaps of scoria. Former owner was the Dallas Pyrites Co., work stopping on the death of the late Alexander Grant Dallas. The property carries a very wide lens of cupriferous pyrite, with outcrops traced 1,100 meters, only 220 meters of the extension having been exploited.

The principal workings, at the eastern end, show an orebody up to 45 meters in width, with an average width of 33 meters, for a length of 200 meters, with workings to a depth of 30 meters. There also are old workings at the western end, but the openings are caved so badly that opencast operations are necessary in the central portion. Apparently the balance of ore in the old workings could be obtained by dry walling, to replace the ore mined. The old mine has 2 shafts, each 157' deep, with 3 levels, opened pillar-and-stall, leaving large quantities of good ore in the pillars and floors. The upper workings in the eastern end produced ore of 2.5 to 8% copper tenor, succeeded by ore lower in copper, but of good sulphur tenor. There are about 1,200,000 tons of ore available underground, and

much more if worked opencast. There are evidences of large orebodies to the east of the present workings, and the entire deposit is rich in sulphur and probably workable to good depth, even without any material copper contents. The main shaft is vertical, with headgear and cages.

Equipment includes a 24-h. p. hoist and an air compressor. The mine is served by the Tharsis railway, with rather high freight rates, and somewhat congested traffic. Mine waters, when surcharged, carry 3 kgs. copper per cubic meter, and leaching is conducted in the same manner as at the Cabezas del Pasto mines. This is one of the most promising of the ancient mines of the Iberian peninsula, and is considered capable of making a considerable production, if given adequate development, cheaper transportation, or local reduction works, but should be consolidated with adjoining properties and worked with steam shovels.

LARRAGUIBEL; JOSÉ.

CHILE

Mine office: Algarrobito, La Serena, Coquimbo, Chile. Property is the Pajalones mine, having a vein of 1 meter average width, opened to depth of 130 meters, with horizontal workings for 400 meters length. Production 1903, was 400 metric tons of ore averaging 14% copper tenor, equal to 123,457 lbs. fine copper. Idle.

LAURA DE HUANTAJAYA; COMPANIA MINERA.

CHILE

Mine office: Huantajaya, Tarapacá, Chile. Organized Sept. 26, 1902, under laws of Chile, capitalization 60,000 pesos, shares 300 pesos par. No trace of operations secured and presumably no longer doing business.

LAVINIA DE HUANTAJAYA; SOCIEDAD MINERA.

CHILE

Office: Iquique, Chile. Mine office: Huantajaya, Tarapacá, Chile. Organized Oct. 29, 1906, under laws of Chile, capitalization 100,000 pesos, shares 100 pesos par. Company reported dormant.

LEALTAD COPPER MINE CO.

SPAIN

Office: 5 Blvd. Magenta, Paris, France. Mine address: Dr. Rene Le Fournier, manager, Linares de la Sierra, Huelva, Spain. John R. Catlin, superintendent, at last accounts. Organized July, 1907, under laws of New Jersey, capitalization \$500,000. Property, 17 miles from Almonáster, the nearest rail point, carries copper, nickel and cobalt ores. No recent returns secured.

LEVANT MINING CO., LTD.

ENGLAND

Office: Pendeen, R. S. O., Cornwall, Eng. Mine office: St. Just, Cornwall, Eng. F. F. Oats, chairman; H. Bolitho, W. James, H. Olds, Frank Oats and G. Oats, directors; Maj. Richard White, purser; Capt. Benj. Nicholas, gen. mgr. Organized 1872, under laws of England, as a cost-book company, with 2,500 shares; issued 2,385 shares, on which £16 12s. 6d. per share has been paid in, last call having been 4s., Oct., 1910, with no previous calls 1898 to 1908, with dividend disbursements of £42 18s. 6d. per share, last dividend having been 15s., Dec., 1912. Accounts are made up every 16 weeks. The mine has been worked continuously since 1820, paying £170,000 in dividends during its first 20 years of operation. The mine is now a small producer only of tin and copper ores, mainly the former, but in 1906 produced 2,140 long tons of copper ore of 12% average tenor, yielding 575,000 lbs. fine copper, rendering the Levant the largest copper producer of England.

Operations for year 1911-12 showed an output of 8,557 tons of ore crushed and treated, yielding copper and tin sold for £14,940, at a total cost for labor, etc., of £15,344, or a loss of £404.

LIBIOLA COPPER MINING CO., LTD.

ITALY

Office: Bishopsgate House, 80 Bishopsgate, London, E. C., Eng. Mine office: Sestri Levante, Genoa, Liguria, Italy. Kenneth Haweis James, chair-

man; Thomas V. Anthony and Albert Straube, directors; W. S. Bartlett, sec.; Robert H. Craven, mine mgr. Organized Jan., 1867, under laws of Great Britain, and reconstructed 1888, capitalization £252,000, shares £5 par. Paid dividends of 2s. 6d. in 1903; 3s. 6d. in 1904; 3s. 6d. in 1905; 2s. 6d. in 1907; 2s. in 1908; 1s. 6d. in 1909; 1s. 6d. in 1910; 2s. in 1911; 3s. in 1912, with total dividends of £5 5s. 6d. to end of 1912. Property is worked through a subsidiary company, organized under laws of Italy.

Property, 4 claims, leasehold, 1,000 hectares, also a half-hectare mill site, including the Libiola mine, in the Carrara district. The mine, worked by the Romans, and reopened 1867, has about 10 miles of workings. The property has veins of good average size in serpentine and diabase, carrying a little malachite in the upper workings, but mainly chalcopyrite associated with pyrite, ores estimated by management to average 3.99% copper and 45.9% sulphur, with 82,350 tons of ore blocked out for stoping at the end of 1911.

Equipment includes a 150-h. p. steam plant, 60-h. p. electric plant and a 30-h. p. hydraulic plant, with 90 h. p. used at the mine and 150 h. p. at the mill. There is 1 hoist, and 2 air compressors of 12 drills aggregate capacity. The mine has a machine shop, smithy and carpenter shop, all of stone, and there is a sawmill, with band saws.

The mill, covering 550 square meters, is built of reinforced concrete and stone, and has a daily capacity of 180 tons.

Production was 18,494 tons of ore in 1912, of which about 15% was copper ore averaging 7.22%, production of fine copper being about 463,000 lbs. The company is well managed and by careful handling the property, though small and by no means rich, is made to return satisfactory profits.

LIBIOLA; SOC. ANON. per L'ESERCIZIO DELLA

MINIERE DI.

ITALY

Mine office: Sestri Levante, Genoa, Liguria, Italy. Property under lease to the Libiola Copper Mining Co., Ltd., and described thereunder.

LIGURE RAMIFERA; SOCIETÀ.

ITALY

In liquidation, 1913. Office: Genoa, Italy. Mine office: Casarza, Genoa, Italy. Lands include a number of small and old copper properties, including the Bargone and Gallinaria mines at Casarza, Genoa; the Bordeneto and Monte Loreto mines at Castiglione, Genoa, and the Monte Capra, Fontanelle, Rio Albareta, Rio Monticello and Rio dei Fichi mines, in the vicinity, these properties all carrying chalcopyrite, with quartzose gangue.

LITHGOW SMELTER.

NEW SOUTH WALES

Owned by Great Cobar, Ltd., at Lithgow, Cook Co., N. S. W., Aus.

LIVERPOOL SILVER & COPPER CO., LTD.

ENGLAND

Works office: Widnes, Lancashire, Eng. Property is a small reduction plant having an electrolytic refinery with capacity for 700 tons monthly, and a sulphate of copper plant.

LLAILLAI SMELTER.

CHILE

Owned by Guillermo Carvallo, at Llaillai, Valparaiso, Chile.

"LLOYD" COPPER CO., LTD.

NEW SOUTH WALES

Colonial secretary and address: J. Sarram, 31 Lombard Chambers, 107 Pitt St., Sydney, N. S. W., Aus. English secretary: H. A. McMahon, Winchester House, London, E. C., Eng. Mine office: Burruga, Bathurst Co., N. S. W., Aus. C. J. McMahon, chairman; W. Soutar, colonial director; preceding officers, A. E. Barton, F. H. Aaron, Alex. Creighton Arthur and J. T. Mail, directors; J. O. Armstrong, gen. mgr.; Dr. R. Logan Jack, cons. engr.

Organized May 9, 1899, capitalization £250,000, increased Nov., 1906,

to £300,000, and reorganized April 15, 1912, capitalization £280,000, shares £1 par; issued 235,000 shares, 19s. 6d. paid. Capitalization was increased £50,000 to extinguish an equal amount of 10% debentures. Company had a share interest in the Murrin Copper Co., Ltd., which proved a failure. Profits, 1907, were £32,419, from which a 1s. dividend, of £15,000, was paid March 2, 1907.

Lands, 853 acres, formerly known as the Burraga and Thompson's Creek mine, 1 mile from Burraga, in the Bathurst district, which is arid, and operations are suspended at uncomfortably frequent intervals from lack of water, though the mine has an 85,000,000-gal. storage tank holding about 9 months' water supply.

Ore carries slightly argentiferous chalcopyrite, with quartz gangue, occurring in fissure veins traversing acid diorite. The main vein has an ore shoot of about 700' length worked to depth of 750'. The vein ranges 3 to 8' in width, with an average of about 5'. The ore is highly silicious and gave average returns 1907, of 2.36% copper. To the eastward is a fault cutting off the extension of the vein from the 1st to the 14th levels, but protracted search has shown a continuation of the vein, to the eastward of the fault, which has given a 300' horizontal downthrow, the discovery of the extension greatly improving the prospects of the property. The future of the mine apparently depends upon the eastern ground, as it is practically worked out between the Melbourne and Sydney faults. Ore reserves at end of 1912 are estimated at 120,000 tons of about 4% copper tenor.

Equipment includes steam and electric power, with hoists. Buildings include necessary shops and mine structures. Fuel is hardwood, about 75 choppers being employed when the property is in operation, as fuel requirements are about 60,000 cords yearly. Much trouble is experienced from shortage of wood. A 9-mile tram line was built 1912, at a cost of about £20,000. About 500 men are employed, normally.

The reduction plant includes a concentrator and smelter, built 1901, at a cost of £32,000, and overhauled and enlarged 1906. Present equipment includes a 40-ton calcining furnace, 19x48' over all, treating 40-ton charges of matte, and a reverberatory furnace, 23x65' over all, hearth having an inside width of 20', with grate area of 6x8', and 5 charging hoppers; 64% matte is made and shipped direct to the refinery. A Minerals Separation plant for froth flotation concentration is being erected, 1913.

From beginning of mining to the end of 1908, when operations ceased, the company smelted 389,221 long tons of ore, yielding 15,812 long tons of fine copper, largest production having been 2,947,200 lbs. in 1902. Production was resumed Jan., 1913, being about 110 tons of ore daily, of which about 10 tons is 12% smelting ore and the balance is milled, yielding 18 tons of 14% copper concentrate.

LOBBS HOLE COPPER MINE, N. L.

NEW SOUTH WALES

In liquidation. Alex. Jobson, liquidator, Ocean House, Moore St., Sydney, N. S. W., Aus. Mine near Kiandra, Wallace Co., N. S. W., Aus. Organized April 30, 1907, under laws of New South Wales, capitalization £50,000, shares £1 par, in half full-paid and half 10s. paid shares.

Lands, 4 claims, leasehold, 140 acres, 12 miles from Kiandra and 45 miles from a railway, are located in the bottom of a deep gorge, blocked by snow each winter. The property shows fissure veins in Silurian slate, the main vein traceable 1,500', ranging up to 4' in extreme width, but averaging 4 to 18", with a paystreak of about 7" width, partly massive chalcopyrite, estimated to average about 12% copper and easily hand-sorted to 28% average copper tenor. Development is by a 210' main shaft, with crosscut tunnels of 50' and 120', the mine having about 2,000' of workings.

The mine was discovered 1874, and worked intermittently until taken over by the present company, yielding, to end of 1906, about 2,000 tons of selected ore averaging about 28% copper, with 2,000 tons of second-grade ore stocked at the mine, part of which has been washed away by floods.

A hydraulic installation with a Pelton wheel develops 120 h. p. from the Yarrangobilly river, and there is 1 hoist.

The smelter, receiving ore from the mine by tram, has a 20-ton reverberatory furnace, making matte of 45 to 50% copper tenor. Mine was let on 4 years' tribute, May 9, 1910, but has been practically idle since Aug., 1912.

LOBRAR SMELTER (FUNDICION DE LOBRAR).

CHILE

Owned by Tomas Morambio, Lobrar, Atacama, Chile.

LOGANOFF; PRINCE G. G.

TURKESTAN

Mine office: Naukutsy, Namagan, Ferghana, Turkestan. Property includes the Naukutsy and Rostovsky copper mines, opened by shafts and equipped with steam power. Production is 10,840 tons of silicious sulphide copper ore annually.

LOHMANN; CARLOS.

PERU

Mine office: Quequeña, Arequipa, Peru. Lands, 70 hectares, including Tres Cerros and Cerro Verde mines. Los Tres Cerros mine, in the district of Quequeña, 27 kilometers from Arequipa, produces sulphide ores said to average 12% copper, 6 oz. silver and 3 to 4 grams gold per metric ton, employing about 40 men, normally. El Cerro Verde mine, in the district of Uchumayo, 4 hours by rail from Arequipa, has produced copper ores, including cuprite and chalcopyrite, and is said to show large bodies of ore of good average copper tenor.

LONDON METAL BANKING CO., LTD.

NEW SOUTH WALES

Office: 18 Fenchurch St., London, E. C., Eng. Company owns and operates the Gulf Creek copper mine, at Gulf creek, via Barraba, N. S. W., Aus.

LONDON VENTURE CORPORATION, LTD.

ENGLAND

F. Cook, liquidator, 16 Philpot Lane, London, E. C., Eng. Reconstructed 1913, as Venture Trust, Ltd.

LORD LAMINGTON MINE.

QUEENSLAND

Mine address: Mount Morgan, Raglan Co., Queensland. Lands, 40 acres, 3 miles east of Mount Morgan, developed by a 52' shaft, show black oxide of copper with small gold values. A test shipment of 20 tons, 1912, yielded 5% copper and 50 cts. gold per ton. The mine was idle the first half of 1913, but was reported to be operating on a small scale in Sept., 1913.

LOS ANGELES; COMPANIA MINERA.

BOLIVIA

Mine near Coro Coro, La Paz, Bolivia. Is a small producer of native copper from the sandstone and conglomerate strata of this locality.

LOTA i CORONEL; NUEVA SOCIEDAD COMPANIA DE.

CHILE

Office: Valparaíso, Chile. Mine offices: Carrizalillo, Chañaral, Atacama, Chile, and Algarrobo, Copiapó, Atacama, Chile. Works offices: Lota, Concepción, Atacama, Chile, and Los Condes, Santiago, Chile. Santiago Collins, manager. Organized under laws of Chile, capitalization 18,000,000 pesos.

Lands include the Mina Descubridora, at Carrizalillo, opened 1850, which is about 650' in depth; the Lota mine, at Lota, opened 1856, and the Maitenes mine, at Los Condes, opened 1844. These properties carry large bodies of ore low in average copper tenor and high in silica, rendering them difficult of reduction. The company also owns coal mines, including the Bueno

Retiro, 5 kilometers north of Coronel, and the Hacienda de Coronel. These mines have steam and electric power, with railroad service.

The Mina Viuda, 5 pertenencias, at Mineral del Algarrobo, in the vicinity of Caldera, has a vein of about 4' average width, carrying chalcoppyrite, and has been developed on a considerable scale, to depth of 377 meters, and for a horizontal length of 325 meters.

The Lota smelter, Fundición de Lota, employs 300 to 350 men, at average wages of 4 pesos daily, and is the principal custom smelter of Chile. The works include a mill with crushers and 3 sets of rolls. The smelter has 16 small reverberatories for calcining, 6 small casting furnaces for matte, 6 small casting furnaces for Chile bars, 1 casting furnace for ingots, and 3 water-jacket blast furnaces. Product is Chile bars averaging 99.5% copper. Slags, averaging above 1% copper are granulated and washed out in a launder. Equipment includes 2 blowing engines, 5 small engines of 43 h. p. each, and hydraulic turbines aggregating 204 h. p. The works have electric light. Sea water for steaming purposes and general use is distilled to the extent of about 10 tons daily, being evaporated in 2 circular wooden tanks, for supplying the water-jackets. Fuel is domestic coal, of poor quality, costing 10 pesos per metric ton, and domestic coke, 5 tons of which are required to reduce 1 ton of ore.

The Maitenes smelter is at Los Condes, 45 kilometers from Santiago, the nearest rail point, with freight rates of 7 pesos per metric ton in, and 6 pesos out. The works include a crushing plant, 3 reverberatory furnaces and a 30-ton cylindrical water-jacket blast furnace, that was doing semipyrritic smelting 1909, on ores from Los Bronces district. This was the first Chilean smelter to install converters, which were added 1885, but the converter plant was practically abandoned 1903, because inadequate matte supply for continuous work rendered the cost of conversion prohibitory. The converter department has four 56x72" shells, and an air compressor plant.

The Viuda smelter, acquired 1908, in connection with the Mina Viuda and other mines at Algarrobo, has a 53x66" water-jacket blast furnace, No. 5 Connorsville blower, and a pump for water circulation.

The smelters are by no means up to date, but the practice has been carefully adapted to local conditions, and the company maintains its position as the leading custom smelter of Chile.

LOVEDEN MINING CO. (1903), LTD.

WALES

Office: 52 Queen Victoria St., London, E. C., Eng. Mine office: Penrhyngerwyn, Cardiganshire, Wales. Wm. E. Martin, director. Organized Dec. 9, 1903, under laws of Great Britain, capitalization £30,000, shares 5s. par. Debentures, £3,500 authorized; £2,700 outstanding. Property is a lead and copper mine, 150 acres, on the Farm Penrhyngerwyn, held under lease for several years.

LYELL CONSOLS MINE.

TASMANIA

See Mt. Lyell Consols Copper Mines, N. L.

LYNGENFJORD KOBBERVÆRK.

NORWAY

Owned by Norwegian-American Copper Mining & Smelting Co.

LYON'S BALFOUR COPPER ASSOCIATION.

TASMANIA

Office: Hobart, Tasmania. Mine office: Mt. Balfour, Russell Co., Tasmania. John Kennedy, E. Maxwell, J. Grimmond, J. Crowe, Hon. C. E. Davies, A. Ashbolt, T. Ball, Howard Wright and Geo. Becham, directors; J. H. Lyon, manager. Lands, 4 sections, 160 acres, showing in the middle claim a N.-S. lode of honeycomb quartz with chalcoppyrite and covellite. Property lies east of and across the Lindsay river gorge, from the holdings of the Mt. Lyell Mining & Railway Co., Ltd.

MACDONALD COPPER MINES, LTD.**QUEENSLAND**

Address: A. Hughes, secretary, 88 West Regent St., Glasgow, Scotland. Mine office: Chillagoe, Lynd Co., Queensland, Aus. H. Allan, R. T. Moore and A. Macdonald, directors; A. M. Hawkes, gen. mgr. Organized May 27, 1910, under laws of Great Britain, capitalization £12,500, shares £1 par; issued 10,000 shares. Property is the Jubilee mine, near Mungana, acquired for £5,000 in fully paid shares.

MAGALLANES; SOC. ESPLIT. DE MINAS DE.**CHILE**

Office and mine: Punta Arenas, Magallanes, Chile. Organized Oct. 20, 1904, under laws of Chile, capitalization £15,000, shares £1 par. Was a prospect on which little or no work was done. The district has been recently active, but this company appears dormant.

MAGPIE COPPER MINE.**QUEENSLAND**

Mine address: Mount Emma, Balurga Co., Queensland. Olsen and Mallet, owners. Has high-grade copper ores, and early 1913, was shipping 30 tons monthly to the Chillagoe smelters. Employs 6 men.

MAIDENPEK; SOC. ANON. DES MINES DE CUIVRE DE.**SERVIA**

Office: Brussels, Belgium. Mine office: Majdanpek, Servia. Employs 500 men. Emile Thorez, chairman; Emile Fromont, mgr.; Chas. Brunard, sec.; Leo Zenzes, mgr.; Alfred Müller, smelter supt., at last accounts. Organized 1903, under laws of Belgium, and legalized in Servia, capitalization 5,000,000 francs, shares 500 francs par. Profits were £7,588 in 1910 and £12,480 in 1911.

Lands are mineral concessions covering 18,800 hectares, 10 miles from the Danube and 75 miles N. E. of Belgrade, showing limestone cut by banatite, a granular, igneous rock. The orebodies carry chalcopryrite, with some chalcocite, bornite and covellite, associated with pyrite and occasional magnetite, in quartzose gangue, ores averaging about 3% copper, 0.4 oz. silver and 75 cts. gold per ton. Property examined by Brenton Symons, M. I. C. E., in 1912.

Transportation is furnished by a 10-mile Bleichert aerial tram, from the mine to the Danube, and there is a half mile Bleichert aerial tram between the mine and smelter.

The smelter formerly had three 40-ton Herreshoff water-jacket blast furnaces, and a 200-ton blast furnace was installed 1907, to employ the Knudsen pyritic process of smelting. Product is blister copper, averaging 96% copper, 14 oz. silver and 1.5 oz. gold per ton. The mines produced, 1912, in addition to copper, about 37,000 tons of iron pyrites of $\frac{1}{2}$ to 1% copper tenor.

MAIPO; COMPAÑIA MINERA DE.**CHILE**

Mine office: Cajon de Maipo, Victoria, Santiago, Chile. Works office: El Volcan, Victoria, Santiago, Chile. Gregorio Donoso, general manager.

Property includes El Volcan, San Simón, Juanita and other mines, carrying about 2,500 meters of the strike of a vein 3 to 16' thick, cutting sedimentary rocks and syenite. The vein runs N. 45° E., is nearly vertical and averages 7' wide. The upper portion of the vein is strongly ferruginous and micaceous, with limestone and quartz gangue, the oxidized ores are followed, at slight depth, by chalcopryrite. The general average of the ore is 4 to 5%. The ore is picked to eliminate iron. Greatest depth of mine is about 170 meters, and workings extend for a distance of 1,800 meters.

The mine has 4 Siemens & Halske electric drills, taking a 305-volt current at 3 amperes, and these machines have given excellent results, despite troubles with similar drills at other Chilean mines.

The mill has a Blake crusher and an Elmore vacuum oil flotation process plant, which is said to have given very good results.

The smelter has four 54" circular water-jacket blast furnaces, and two 36x72" quadrangular blast furnaces, with room for a third. Improvements have reduced coke charges from 18% to about 14%, increased the capacity of the larger furnaces from 50 tons to 65 metric tons per day, and lengthened the campaign of each furnace to 35 days, from the former figure of only 20 days. Fuel is imported coke, costing 47 pesos per ton, delivered. Slags from low-grade ores occasionally run as low as 0.1%. There are 6 Connorsville and Fargot et Fils blowers. The converter department has 1 platform, with five 1.68x1.82-meter shells, converting 20 tons of 45% matte into 9 tons of 98% blister copper in 8 operations. Freight rate on matte and Chile bars is 23.3 pesos per metric ton, to the seaboard. Forces average about 600 men at the mines and works at average wages of 3 pesos daily.

The power plant, at the smelter, takes water from the Volcan river, a tributary of the Rio Maipo, with ample supply. There are 100-h. p. and 200-h. p. turbines, direct-connected to 2 Siemens & Halske dynamos, generating electric power at 440 volts for the hoists, blowing engines and pumps.

MAITENES SMELTER.

CHILE

Owned by Nueva Sociedad Compañía de Iota i Coronel, at Los Condes, Santiago, Chile.

MAKIMINE MINE.

JAPAN

Owned by Mitsu Bishi Goshi-Kwaisha.

MALDINI DE COLLAHUASI; SOCIEDAD.

CHILE

Office: Iquique, Chile. Mine office: Collahuasi, Tarapacá, Chile. Organized Aug. 8, 1905, under laws of Chile, capitalization 160,000 pesos, shares 100 pesos par. Letters returned unclaimed from Iquique.

MALGO DEVELOPING SYNDICATE, LTD.

TRANSVAAL

P. O. address: Box 486, Johannesburg, S. A. Mine office: Motale, Zoutpansberg, Transvaal. J. M. Calderwood, consulting engineer. Organized Nov., 1909, under laws of Transvaal, capitalization £10,000, increased Oct., 1910, to £12,500. Lands, 3,500 claims, on the Motale river, between Molena and Motale, in a tract 1 mile wide and 9 miles long, cut by the Motale river, carrying 4 veins. The property is 165 miles from a railway, but an extension of the Selati line is hoped for. Lands carry copper and iron ores, coal and limestone, and water power is available. Work was begun 1909, and about 1,000' of openings were made in the first year. Development is by 4 shafts, of 60 to 145', with a 100' tunnel and 500' drift, developing a 3' vein carrying malachite, chalcocite and gray copper, giving assays up to 29% copper. Native labor is abundant and good. Has steam power. Company refuses information, 1913.

MALSAA COPPER WORKS.

NORWAY

Office: care H. & F. Bachke, owners, Drontheim, Norway. Property comprises the Archbold and Crowe mines, situated in the parish of Vaerdalen, North Drontheim county. Inactive at present.

MAMISSON COPPER SYNDICATE, LTD.

RUSSIA

In liquidation. C. Hand, 74 Coleman St., London, E. C., Eng., liquidator.

MAMMOTH COPPER MINE, LTD.

QUEENSLAND

Secretary's address: A. Hughes, 88 West Regent St., Glasgow, Scotland. Mine office: Cardross via Mungana, Chillagoe, Queensland. A. Macdonald, R. T. Moore and H. Allen, directors; J. D. Audley Smith, cons. engr.; C. G. Rutledge, gen. mgr. Organized May 20, 1907, under laws of Great Britain, capitalization £10,000, increased to £55,000, shares £1 par; issued, £17,000.

Lands, 27 claims, 210 acres, in 5 groups, 1 to 12 miles from Klondye,

and about 25 miles N. W. of Mungana, including water rights on the Walsh river.

The Keppoch mine, 20 acres, about 1 mile east of Klondyke, has a 6' vein carrying 18" and 24" footwall and hanging-wall paystreaks, giving assays of about 8% copper and 1 oz. gold per ton, developed by a shallow shaft, having a steam hoist.

The Mountain Maid mine, about 5 miles south of Klondyke, showing 2 prominent outcrops, is developed by a 42' incline shaft, and what is called a vertical shaft, sunk for first 25' vertically, and for 128' below at 80°. Drifts on the bottom are in ore assaying up to 15% copper, with traces of silver and gold. Equipment includes a 6-drill air compressor.

The Chieftain mine, acquired 1911, is developed by a 172' shaft. The openings above the 110' level show a 20' vein of chalcopryite carrying up to 14% copper, \$2 gold and 5 oz. silver per ton. Ore reserves are estimated at 35,000 tons of about 8.5% copper tenor. The shaft is equipped with a steam hoist good for a depth of about 300'.

The smelter, erected 1912, of 70 tons daily capacity, has a 34x120" W. J. blast furnace, making copper matte of about 40% copper tenor which is sent to Chillagoe for conversion into blister copper.

MAMPEI IMAMURA.

JAPAN

See Inari mine.

MANSFELD COPPERSCHIST MINING CO.

GERMANY

(MANSFELD'SCHE KUPFERSCHIEFERBAUENDE GEW.)

Mine office: Eisleben. Prussian Saxony, Germany. Dr. Dittrich, Dr. Lehmann, Dr. Lengnick, E. Kreuser, Br. Windisch and I. J. Tobias executive committee; Bergrat Dr. Vogelsang, gen. mgr.; Rudolph Franke, gen. smelter supt.; Herr Ludwig, gen. mg. supt.

Organized 1852, as a consolidation of numerous independent operators, and reorganized, April 10, 1876, under laws of Prussia, capitalization 69,120 shares, apparently without assigned value. Dividends have been: 90 marks per share in 1900; 45 marks in 1901; 15 marks in 1902; 40 marks in 1903; 40 marks in 1904; 80 marks in 1905; 120 marks in 1906; 70 marks in 1907; nothing in 1908 and 1909; 10 marks in 1910; 15 marks in 1911; 45 marks in 1912.

Treasury shares to the amount of 2,000,000 marks, and a new issue of 5,000,000 marks, were authorized 1908, to provide for the deepening of shafts, the rebuilding and enlarging of the electrical plants at the Krughütte and Kupferkammer works, the construction of new copper and brass works at Hettstedt, and other improvements.

Forces employed are upwards of 22,000 men, and exclusive of the Westfalen coal mines, averaged 19,735 men 1912, of whom about 70% were employed at the mines and 13% at the smelters.

Lands are very extensive, including besides the Mansfeld copper mine, large coal mines in Westphalia, and a potash bed near Wansleben, opened by 1 shaft, which has been in operation since 1903. Landed holdings also include considerable tracts of forest.

The coal mines at Langendreer, near Hamm, Westfalen, include several adjoining mines, with 4 operating shafts, and in connection is a coke plant of about 225,000 metric tons yearly capacity, production averaging about 2,500 metric tons of coal and coke daily. There are 2 crushing plants, 1 near Walzwerke and the other at Rothenberg.

The Mansfeld mine was opened A. D. 1199, was immensely profitable during the fourteenth and fifteenth centuries, but the industry nearly suffered extinction during the Thirty Years' War. Activity was resumed in 1671, when the right of working the mines was declared free, this resulting

in the building up of a great number of small independent operators. The present company was first formed 1852, as a consolidation of the various small mine operators and smelters, and the merging of many small interests has resulted in a nearly seventeenfold increase of production, from 1,179 metric tons fine copper and 6,489 kilograms silver in 1852.

The principal orebody of the Mansfeld mines is the kupferschiefer, a fine-grained bituminous shale, lying nearly horizontal, having a dip of about 5° only, with average thickness of 1', of which only 8" are workable, but covering several hundred sq. miles. The principal ore is slightly argentiferous chalcopryite, bornite and chalcocite, occurring as speiss, disseminated in very fine grains through the kupferschiefer. Lying just under the kupferschiefer is an arenaceous shale, carrying chalcopryite. There also is a slightly cupriferous limestone bed, known as the Dachberg. The kupferschiefer carries 2.9 to 10% copper, and ores smelted average 2.5 to 3% copper and 0.015 to 0.020% silver.

The mine has been modernized in methods and equipment since the beginning of the 20th century. Owing to the great age and extent of the old workings, the headings usually were 2 to 4 kilometers from the shafts, hence the actual mining was done under considerable disadvantages, the thinness of the bed and the great extent of the workings rendering it necessary for the miners to work on their sides, bellies or backs, as in coal mines, wearing boards upon their trunks and thighs, in order to protect themselves from the rock floors. Present mining operations are through a row of 6 deep-level hoisting shafts, intersecting the kupferschiefer at depths of 300 to 600 meters. Three other shafts reach the seam at still greater depths, and 2 of these also intersect a bed of excellent carnallite. These shafts are all circular, 6 meters in diameter, with a lining of brick, backed by concrete. Many of the scores of old shafts, which average about 400 meters in depth, are used for ventilation, safety and raising water. The principal new shafts are the Hohenthal, at Helbra, the Herman, at Helfta, and the Paul, at Helmsdorf. All new shafts have steel headgears. Underground haulage, formerly done by horses, is to be supplanted by electric locomotives, in the newer workings. Ore is hand-sorted on reaching surface, and waste rock, including considerable limestone, is used for underground filling.

Water from the entire mine is drained to the Hohenthal, Ernst and Niewandt shafts, whence it is raised by steam and electric pumps to the main adit, 150 meters below surface.

The machinery equipment of the mine is very complete. The shafts have mainly cross-compound steam hoists, with conical drums for deep winding, but the Hermann and Paul shafts and the newer exploratory shafts have Ilgner electric hoists. All hoisting is done by double-deck cages, raising 4 trucks. Electric power is used extensively and increasingly, and this is developed mainly from gas installations, with power stations at the Krughütte and Kupferkammer reduction plants.

The company maintains independent machine shops, capable of repairing or building any mining or pumping machinery in use, and also has extensive smithies and wood-working shops.

The Krughütte gas power station has two 1,300-h. p. units, the blast furnaces being connected with 2 parallel gas trunks, taking blast gases to a purifier house, where there are Zschokke and Theisen centrifugal washers, through which the gas passes, and is then dried by passing through a Theisen vapor separator, going thence to a gasometer of 500 cubic meters capacity, from whence it is drawn, as required, to two 1,300-h. p. Ochelhäuser gas engines, direct-connected to a Siemens-Schuckert 3-phase alter-

nator of revolving field type. Current is transmitted to various works at 3,000 to 10,000 volts, and there stepped down for use.

Transportation is by railway lines and a number of Otto aerial trams, the Hermann mine having a 7-kilometer electric aerial tram.

The Mansfeld has numerous reduction plants, including 2 smelters for raw ores, 2 roasting smelters with acid plants, 2 matte smelting works, and a desilverizing plant, the various works having a total of 13 reverberatory furnaces.

The method of reduction is by heap roasting, and calcining in shaft furnaces. Roast heaps are built about 1,000 meters long, 6.5 meters broad at the bottom and 3.5 meters broad at the top, and 2 meters high. The only fuel used is a little brushwood, at the edges and bottoms of heaps, and each heap is roasted about 4 weeks. If the ore carries any fines, these are screened, briquetted and added to the roast heaps. Roasting reduces the ore 7 to 10% in weight, and is more for the elimination of carbon dioxide and bituminous matter than to throw off sulphur, the latter running only 2 to 3% in the raw ore, while the bituminous matter ranges 10 to 17%, and carbon dioxide 7 to 13%. There are 2 roast stalls near the shafts, and at the furnaces the first-fusion product is a matte carrying 40% copper and 0.25% silver. This matte is broken up and roasted in 2 calcining kilns, and the roasted matte, with the addition of 5 to 10% raw matte, is smelted in reverberatory furnaces to white metal carrying 74 to 75% copper and 0.45 to 0.50% silver. The slags from the white metal carry 4 to 6% copper and are returned to the shaft furnaces. Slag is utilized extensively for the manufacture of slag brick and paving blocks. The white metal is ground in Krupp ball mills and sent to the Saigerhütte refinery.

The Kochhütte, at Helbra, is the principal smelter, treating about three-fifths of the total production. There are 8 furnaces, 1 held in reserve, of circular shaft type, using cold blast.

The Krughütte treats about two-fifths of the total production. This plant, at Eisleben, near the mines, has 6 furnaces, 1 being held as a spare, of circular shaft type, with forehearths, using cold blast.

The Eckardthütte, at Leimbach, has 4 copper furnaces of circular shaft type, using cold blast. This plant also has 1 lead stack, producing silver-lead matte, and makes a little nickel speiss from resmelted flue dust. In connection with the Eckardthütte is an acid plant having 72 kilns and 5 lead acid chambers, using the chamber process of acid making.

The Kupferkammerhütte, at Hettstedt, has 3 furnaces of circular shaft type, but, unlike the other plants, employs a hot blast to some extent. The acid plant at the Kupferkammerhütte has 82 kilns and 6 lead acid chambers, turning out 50 metric tons of 50° Beaumé sulphuric acid weekly.

The Gottesbelohnungshütte is one of the smaller and less modern smelters, equipment consisting of 13 small reverberatory furnaces, 17 roasting furnaces and 2 small furnaces for refining slags.

The Saigerhütte is mainly a refinery, including a desilverizing plant, operating on the Ziervogel process, which roasts the matte and retains the silver as a sulphate, which is dissolved in water and the solution run over metallic copper, which precipitates the silver, the cement silver so secured being pressed and resmelted to metal .999 fine. The final furnace product, after the extraction of the silver, is blister copper of 99.7 to 99.8% tenor.

Production, which was only 5,865,898 lbs. in 1867, increased to 15,230,287 lbs. in 1877, to 29,176,000 lbs. in 1887, and 40,230,400 lbs. in 1897. Recent production has been as follows: 42,500,278 lbs. in 1903; 41,629,349 lbs. in 1904; 43,824,141 lbs. in 1905; 40,108,000 lbs. in 1906; 38,822,000 lbs. in 1907; 39,686,800 lbs. in 1908; 41,891,400 lbs. in 1909; 44,769,800 lbs. in 1910; 45,955,600

lbs. in 1911; 45,188,600 lbs. in 1912. Production in 1912 was secured from 873,305 metric tons of cupriferous material smelted. The Mansfield is handled with high technical skill, and its orebodies, by reason of their vast extent, are among the very largest known to man.

MANUEL CALDERON.**BOLIVIA**

See Calderon.

MANY PEAKS COPPER MINING CO., LTD.**QUEENSLAND**

Mine office: Miriam Vale, Flinders Co., Queensland, Aus. Capitalization £2,041, shares 6d. par. Property is under lease, since 1906, to the Mt. Morgan Gold Mining Co., Ltd., and is practically owned by that company. The lease, which is irrevocable by the Many Peaks Copper Mining Co., Ltd., calls for a minimum extraction of 25,000 long tons of ore yearly, on a royalty of 6s. 2d. per ton. For the year ending June 30, 1913, the company received £12,381 as royalty.

Lands, 320 acres, well timbered, 25 miles S. W. of Miriam Vale. The property shows promising gossan outcrops, carrying occasional small quantities of copper ore, with a vein up to 90' in width, oxidized to some little depth, but apparently having no secondary sulphides, the zone of oxidation being succeeded by chalcopryite of about 3.5% copper tenor. Development is exclusively by 3 tunnels, the main tunnel being on the 470' level, with 3 levels above, at 100' intervals, these and the main tunnel being driven nearly due south from a gully near the northern end of the property. The walls are somewhat treacherous and require careful attention. During 1912-13, a winze was put down to the 570' level and a 100' drift opened and stopping begun. Ore reserves were estimated 1912, at 1,000,000 tons.

Production for the year ending May 31, 1913, was 99,051 long tons of ore, estimated to carry 3,000,000 lbs. copper and 500 oz. silver. The ore is low in grade but exists in large quantities and is valuable to the Mt. Morgan Co., and it might be difficult for any independent interest to handle the mine as profitably.

MAORILAND COPPER CO., LTD.**NEW ZEALAND**

Office: Christchurch, N. Z. Mine office: Nelson, Waimea Co., N. Z. Harley E. Hooper, gen. mgr.; Edwin Bray, mine mgr.

Property includes several different mines, with 2,000 acres of land. The mines, which show considerable native copper and rich secondary ores, are accessible by good wagon road from Nelson. Principal properties are the United Champion, which has 2 separate mines, carrying mainly chalcopryite ore, opened by a 250' shaft and various tunnels, showing a vein up to 14' in width having 14,603' of workings in 1908. The Monster mine, developed opencast, shows chalcopryite giving average assays of 17% copper and 4 dwts. 17 grains gold per long ton. The Mount Claude mine, opened by tunnels, shows a vein of about 4' width, carrying oxidized ores with a gossan up to 250' width, said to give average assays of 5% copper and 3.8 dwts. gold per long ton. The Doctor mine shows considerable chalcocite and some native copper in a vein up to 11' in width.

The smelter, connected with the mines by a tramway, was built as long ago as 1908, but, by reason of the ore being highly aluminous, the mine was not showing very good results at last accounts and is now closed down.

MARAMBIO; TOMAS.**CHILE**

Office and mine: Peña Blanca, Atacama, Chile. Works office: Labrar, Chile. Property includes a number of mines and a smelter.

The Santa Rosa mine, at Fragueta, 8 leagues from Peña Blanca, is 220 meters deep, has 1,600' level workings opening a vein of 6' average thick-

ness that runs N.-S. and dips at 45°. The Mina Verde, near the Santa Rosa, opened to a depth of 130 meters, produces ore with 18% copper.

The Mina Pequeña, 12 miles from Peña Blanca, is opened to depth of 50 meters only, showing an oxidized zone of about 30 meters depth. The Mina Sereña is opened to a depth of 70 meters, with workings for a horizontal length of 160 meters. The Mina Manto has an outcrop traceable 500 meters and is opened to depth of 120 meters.

The Mina María Luisa is opened to depth of 140 meters. The Mina San Juan was worked originally for silver ore, which changed to copper with depth, and is said to have a 1,800' shaft, which probably is a mistaken figure. The Mina Quebradilla, at San Juan, 13 kilometers from Peña Blanca, has a vein of about 1 meter width, traversing syenite, and is opened for a length of about 300 meters. This property is the principal producer.

The smelter, known as the Fundición de Labrar, is 16 kilometers from Peña Blanca, and 18 kilometers from a railway, employing normally 50 men at average wages of 3 pesos daily. The smelter has a 11x20' reverberatory furnace, with a 50' smokestack.

MARGAM COPPER WORKS.

WALES

Owned by Vivian & Sons and described under that title.

MARQUEQUI; ANGEL.

BOLIVIA

Office and mine: Coro Coro, La Paz, Bolivia. Owns the San Miguel and Toldo mines, carrying native copper in conglomerate strata. Has steam power and has been a small producer of barillas de cobre for some years. No recent returns secured.

MASON & BARRY, LTD.

PORTUGAL

Office: 87 Cannon St., London, E. C., Eng. Mine office: Pomarao, Alemtejo, Portugal. Jas. Francis Mason, J. P., M. P., chairman; D. H. Barry, deputy chairman; Edw. O. Barry, managing director; preceding officers, Henry E. Beddington and Francis Ricardo, directors; Philip O'D. Greene, sec.; Wm. Neville, resident mgr.; Harvey & Wilbraham, cons. engrs.

Organized June, 1878, under laws of Great Britain, and reorganized June 2, 1892, capitalization £210,000, shares £1 par; issued, £185,172. Capitalization was reduced from £1,050,000 by returning to shareholders £4 per share, in 4 payments of £1 each. Net profits were £68,325 in 1906, £66,135 in 1907, £56,701 in 1908, £30,934 in 1909, £65,458 in 1910, £64,546 in 1911. Company has paid dividends regularly since organization, these ranging from 2 to 65%. Recent dividends have been as follows: 13s. in 1901, 11s. in 1902, 7s. in 1903, 7s. in 1904, 7s. in 1905, 7s. in 1906, 6s. in 1907, 6s. in 1908, 5s. in 1909, 6s. in 1910, 6s. in 1911. The company has a staff pension fund.

This company was formed to acquire the lease on the San Domingos copper and sulphur mine at Mertola, Portugal, just over the border of Spain, and in the same belt of pyrite deposits as the Rio Tinto, Tharsis and others. The mine had then been worked since 1858. The report for 1912 shows that 425,963 tons of pyrite was mined and that the shipments of raw and washed ore were 350,733 tons. No details are given as to the production of copper, or as to the nature of the ore mined and shipped. The accounts for 1912 show a profit of £85,665, out of which £20,000 has been placed to reserve and £64,810 distributed as dividend, being at the rate of 35%.

Lands are held by lease for a 50-year term, ending Oct., 1958. The property originally was opened and worked extensively by the Romans. Development is by several shafts, deepest level being at 300 meters from surface. A mineral zone of about 200' width, and proven length of 2,000',

carries lenses of cupriferous pyrite averaging slightly under 1% copper and about 50% sulphur, the principal values being in sulphur rather than in copper. With increasing depth copper values have decreased slowly but steadily.

Ore reserves were 5,250,000 long tons at the end of 1904, and were increased to 7,500,000 at the end of 1909. In 1911 overburden to the extent of 165,964 tons was removed at a cost of £7,711.

Ore is leached for copper values on the same general plan as at the Rio Tinto, and there are about 438,960 long tons of ore, containing about 1,500 long tons fine copper. Sulphur ore is shipped to British works for burning.

The company owns a railway to Pomarao, a tide-water port on the Rio Guadiana, where there is a shipping pier and tugs.

Ore shipments 1912, were 350,733 long tons, compared with 277,583 in 1911. Maximum production was 8,353,229 lbs. fine copper in 1901, and recent production has been as follows: 6,605,760 lbs. in 1904, 6,088,320 lbs. in 1905, 5,519,360 lbs. in 1906, 5,871,040 lbs. in 1907, 6,186,880 lbs. in 1908, 5,299,840 lbs. in 1909, 6,619,200 lbs. in 1910, 6,545,280 lbs. in 1911, 7,925,120 lbs. in 1912. Apparently the day of the San Domingos has passed as an important copper producer, but the property, which has a long and honorable record of production, is carefully managed and is made to yield good profits from its sulphur ores.

MAZE MINE.

JAPAN

Mine office: Terado, Nishi-Kambara, Echigo, Japan. Mine, opened A. D., 1688, has several small veins averaging 12" width, carrying chalcopyrite and pyrite frequently associated with sphalerite and galena, lying mainly in propylite. Ore yields 17 to 20% copper after careful selection.

McKECHNIE BROS.

ENGLAND

Widnes, Lancashire, Eng. Own an electrolytic refinery of about 10 short tons daily capacity, having three 75-kw. generators and 234 tanks, with multiple arrangement of electrodes.

MEDUORUDIANSK MINE.

RUSSIA

See Nijni-Tagilsk Mines & Works.

MELIK-ASARJANZ MINE.

RUSSIA

Office: Lermontovskaija 14, Tiflis, Trans-Caucasia. Mine office: Zange-shur, Elizabetopol, Russia. Property includes the Katarsky and Suninski mines and adjoining properties, near the Ugurchaiska mine. There are 3 shafts developing a number of veins, 3 to 7' thick in diabase. The veins carry chalcopyrite, bornite and covellite ore averaging about 15% copper. A system of 20 known fault fissures is also noted, cutting andesite and diabase, and carrying mainly chalcopyrite with occasional bornite ore, both auriferous and argentiferous, averaging about 7% copper. Workings are primitive, deepest being only about 130', at last accounts. Has hydro-electric power using turbine with power plant on canal, taking water from the Ochtchy Tschai river. Production is around 2,000,000 lbs. fine copper annually.

MELKEDALEN, LTD.

NORWAY

Idle. Office: 23 Leadenhall St., London, E. C., Eng. Mine office: Evenaes, Ofoten Fjord, Tromsö, Norway. Geo. Brooke Mee, chairman, and H. Higgs, directors; W. A. Stearns, sec.; J. D. Holman, cons. engr. Organized April 26, 1904, under laws of Great Britain, as a reconstruction of the Melkedalen Copper Mines, Ltd., capitalization £125,000, shares 10s. par; issued, £79,040.

Lands, 440 acres, freehold, carrying cupriferous pyrite of about 2%

copper tenor. Equipment includes a 150-ton mill, near Rosevanden. Presumably out of business.

MELROSE COPPER MINE.

NEW SOUTH WALES

Mine office: Condoblin, Cunningham Co., N. S. W., Aus. H. Ernest A. Miller, managing director and secretary, at last accounts. Organized Dec. 1, 1903, under laws of New South Wales, capitalization £12,000, shares £5 par.

Lands, 2 claims, 120 acres, held under 21-year lease from the crown, with option of renewal at 5s. royalty per acre yearly, also a 10-acre water right, in the Melrose and Condoblin districts. Property is well timbered, but water is scarce, nearest permanent water available being the Lachlan river, 26 miles south. The government railway is 29 miles distant. The mine was known first as the Boone West, and later as the Anaconda.

The property shows uptilted Silurian slates, often schistose, carrying fissure veins with 4 ore shoots, ranging from 6 to 20' in width, 30 to 50' in length, and proven on the Southern shoot for a depth of 280'. Development is by shafts of 95', 280', 65' and 100' and by a tunnel. Values are erratic, ranging from 2.5 up to 30% copper, with a general average for pay ore of 6 to 8% copper, 3 oz. silver and 2 dwts. gold per ton.

The mine has no machinery equipment, using horsepower and windlass. Property considered promising.

MENA; LORENZO.

CHILE

Office and mine: Cabildo, La Ligua, Aconcagua, Chile. Property includes 2 mines. The Mina Cata, at Los Quemados, 4 miles from the railway at Cabildo, has a vein in granite of 6 to 7' average width, with strike of N. 20° W. and dip of 78°. It has a paystreak 2' thick carrying cupriferous pyrite, reported by the owner to average 4% copper, 22% sulphur and 35% iron, with calcite gangue. Development is by tunnel. Ore, used largely for fluxing, is sold to various custom smelters in the district.

The Mina Santa Rosa, at Nipa, La Ligua, 925 meters above sea level, 8 miles from Cabildo, is developed by a long tunnel, driven on a vein 2 to 3' thick, carrying a 2 to 3" paystreak of massive ore of about 30% copper tenor as mined, dressed by hand to about 40% copper.

MERAKER BRUG; AKTIESELSKABET.

NORWAY

Office: Trondhjem, Norway. Mine at Røros, Norway. Company in process of reorganization June, 1913, and property idle. Property includes the Vigsnes and Stavanger, better known as the Meraker mines, which were among the principal copper producers of Norway, and were worked, 1865-94, by a Franco-Belgian company, yielding about 900,000 tons of cupriferous pyrite. Mines are extensively opened, deepest shaft being 2,410'. Ore carries 1.5 to 6%, with an average of about 2% copper, and 45 to 47% sulphur.

Equipment includes a hydro-electric power plant and there are about 10 miles of aerial trams connecting the mines with the concentrator.

MESSINA (TRANSVAAL) DEVELOPMENT CO., LTD. TRANSVAAL

Address: A. A. Kelsey, secretary, 3 Princess St., London, E. C., Eng. Mine office: Messina, Zoutpansberg, Transvaal. Arthur M. Grenfell, chairman; R. J. Frecheville, John S. P. Samborne and John P. Grenfell, directors; Chas. Stuart, chairman local board; J. M. Calderwood, cons. engr.; A. Woodburn, mine mgr.; T. Nicholls, smelter supt.

Organized Jan. 30, 1905, under laws of Great Britain, capitalization originally £110,000, increased Jan., 1908, to £200,000, and again increased July, 1911, to £250,000, shares 5s. par; issued, £165,451.

Lands, 22,432 acres, including 1,200 claims on the Farm Berkenrode, held under a 99-year lease from the Transvaal government, and 3 freehold

farms having a total area of about 14,000 acres, to which the farm Vogel-sang No. 1423, 6,646 acres, adjoining the farm Berkenrode, was added 1908. Former disputes over titles with the Oceana Consolidated Co., Ltd., were settled satisfactorily. Lands, about 6 miles from the Limpopo river, and about 130 miles north of Pietersburg, carry some timber fit for mining and building purposes, with water available at fairly shallow depth.

The Messina mine shows extensive ancient workings with shallow shafts and opencuts and scoria from old smelting operations extending for a distance of more than 1,000' along the course of the lode.

The country rock is granite, with a mineral zone of about 1,300' width, carrying 5 parallel veins, traceable for about 5 miles on the company's lands. There are 3 lenticular cupriferous deposits, known as the North, Middle and Bonanza lodes, and a little work has been done also on the South vein, which has been proven for about 2,400' length. The North lode is up to 5' in width, and the Middle lode carries chalcocite and bornite. The veins carry oxidized ores for about 100' depth, succeeded by secondary ores, mainly chalcocite, with considerable quantities of bornite and a little chalcopryite, the average grade of ore being exceedingly high.

The mine is opened by a 3-compartment main working shaft, 700' deep, being deepened to 1,000' and by 2 development shafts. The ore is mined by the slicing system, a modification of the caving plan, with 9 levels opened, the bottom level at 900' showing, in No. 5 shaft, an orebody 77' wide, of chalcocite, giving average assays of 14% copper. In Aug., 1913, No. 5 shaft was 824' deep and development work, aggregating 362', showed the Bonanza lode to be 20' wide, averaging 7.9% copper on the 8th level and to show 44' of 8% copper ore on the 9th level. The mine has about 5 miles of workings and ore reserves were estimated, June 30, 1912, as equivalent to 170,000 long tons of copper, with 330,000 tons of probable ore additional. The figures of ore reserves are conservative and, despite the exceedingly high average assay tenor, the official estimates of values are considered reliable.

Power is furnished by a Tangye suction gas producer, retorting charcoal, which is the cheapest fuel available. Equipment includes a double hoist, a new Robey hoist at No. 4 shaft, and a 3-drill air compressor, supplemented by a 10-drill Riedler air compressor.

The mine has a number of good buildings, including necessary shops, engine houses and dwellings for officials. Wood and coal are scarce, but a coal seam of workable quality has been opened in a coal-bearing area, held under option, about 25 miles S. W. of the mines.

The mill, originally of 50-ton capacity, increased 1909, to 65 long tons daily, is equipped with a Blake crusher, crushing rolls, revolving trommels having water sprays, Hartz jigs, 2 Wilfley tables and classifiers. Wash water is taken from the mine and a well, and water is stored in reservoirs. Concentrates were formerly of phenomenally high grade, averaging 60 to 65% copper, with rich middlings and slimes accumulated for future treatment. A new concentrator of 250 tons daily capacity was in the course of erection, 1913. It has Huntington mill and vanners, as well as a complete general equipment.

A smelting plant, with 2 reverberatory furnaces, each $11\frac{1}{2} \times 23'$, has been erected and is now in operation, smelting mill middlings carrying 10% copper and producing 76 tons of 51% matte in August with one furnace.

The construction of a railway was begun 1912, by the Union Government of South Africa, and will connect the mines with Bantolier Kop, Oct., 1913. The work is done under an agreement entered into between the Government and the Messina Co., whereby the latter guarantees for a period of

10 years any loss resulting in the operation of the railway, the amount payable in any 1 year not to exceed $4\frac{1}{2}\%$ on £426,831, the estimated cost of the line and rolling stock. The distance between the mines and Bandolier Kop is about 100 miles and the line when completed will give direct communication with Delagoa bay and Johannesburg.

Production was begun Jan., 1906, and to end of June, 1911, totalled 65,788 tons of ore of about 12% copper tenor. Production for fiscal year ended June, 1912, was 10,347 tons of about 11% copper tenor. Production for the 3 months ending June 30, 1913, was 1,218,067 lbs. copper.

The mill handled 5,960 tons and produced 32.5% copper concentrate. Concentrates are sent to Swansea for reduction. The property is one of proven merit and the management is excellent in every respect.

MESSINA PRIMROSE COPPER COR'N, LTD. SOUTH AUSTRALIA

Secretary's address: S. J. Hancock, 70 Broad St. Avenue, London, E. C., Eng. C. Neilsen and J. S. G. Campbell, directors. Organized June 10, 1911, capitalization £225,000, shares £1 par; issued, £171,982.

Property, known as the Wagendrift farm, 2,046 acres, about 60 miles N. E. of Pietersburg, in the Koodoes valley, has been abandoned and present holdings apparently consist of 680 acres of copper-bearing lands and a 10-acre lease with smelter concession at Beltana in South Australia.

METALS DEVELOPMENT SYNDICATE, LTD. ENGLAND

Secretary's address: F. A. Crew, 20 Copthall Ave., London, E. C., Eng. C. A. Moreing, chairman; W. J. Loring, T. W. Wellsted and E. A. Loring, directors. Organized 1912, capitalization £10,000, shares 5s. par; issued, 7,000 shares. Company has an option on the Treveddoe tin and copper mine at Warleggan, Bodmin, Cornwall.

MICULICICH y VALENTINE.

PERU

Mine office: San Tadeo, Yauli, Junín, Peru. Property is the Mina Gertrudis, owned jointly with the Morococha Mining Co., and described under title of Mina Gertrudis.

MIED CORPORATION.

RUSSIA

Address: Krukoff Channel 14, St. Petersburg, Russia. Capitalization £15,000. The shares are held by the copper-producing and smelting companies in proportion to their importance, the shareholders agreeing to sell only through the Mied Corporation and its sales agents, the Vogau Co.

The Mied (Copper) Corporation is a share company that controls over 90% of the Russian copper production. The sales agent, the Vogau Co., sells only by consent of and at the price fixed by the Mied Corporation, and contracts have been made with most of the copper factories of Russia at prices proportionate to those of the London market. The trust has been instrumental in having a duty of £40 per ton imposed on copper imports, thus barring foreign copper from the Russian market.

The corporation divides the Russian copper industry into 4 classes: (a) Those composing the Mied Corporation and being shareholders thereof. This group produced 30,758,269 lbs. fine copper in 1912, or 41.8% of the total Russian production.

(b) Producers and factories selling exclusively to the Mied Corporation, a group which in 1912 produced 20,827,844 lbs. copper, or 28.2% of the total production of the country.

(c) Independent producers who sell by ordinary agreement to both the Mied Corporation and to outsiders, a group producing 17,627,910 lbs. copper in 1912, or 23.8% of the total Russian production.

(d) Independent anti-trust producers dealing only with outsiders and producing 4,597,401 lbs. copper, or 6.2% of the Russian output in 1912.

The total Russian production for 1912 was 73,911,429 lbs., or 17,430,336

lbs. more than in 1911. The 1913 output is estimated at 77,650,000 lbs. copper.

MIEDNORODIANSK MINE.

RUSSIA

See Rudianski Mines.

MIEDZIANKA MINE.

AUSTRIA

Laszczynski Brothers, owners, Kielce-Checiny, Galicia, Austria. The property is an old mine, about 55 miles north of Cracow, abandoned for nearly a century until taken over by the present owners. Lands show a belt of cupriferous limestone about 150' wide and traceable for $1\frac{1}{4}$ miles, reported to carry copper ore in streaks of $\frac{1}{2}$ to 1" thickness only, ore being mainly chalcocite, with some azurite and malachite, ranging 15 to 45% in copper tenor, having a gangue of calc spar and quartz. The mine has been opened to a depth of 150'.

The mine output is hand-picked, crushed by rolls and molded into blocks, with 5% of clay for a binder, bricks being dried by waste heat from the furnace and partially roasted in a kiln.

The experimental reduction plant is of small capacity only. Roasted ore is crushed fine and leached in lead-lined tanks with spent liquor from the electrolytic baths containing about 5% of free sulphuric acid, giving as a product a liquor containing about 5% copper and 1% free acid. The pulp is put through a filter press, the solution going to electrolytic tanks having lead plate anodes, in cloth bags, and thin sheet-copper cathodes. Current is 1,000 amperes, at 2.5 volts, giving a current density of 1 ampere per square decimeter of cathode surface. Deposition of copper is said to be about 1.1 gram per ampere-hour, nearly equal to the theoretical deposit, and power consumed, per kilogram of copper deposited, is 2.48-kw.-hours. Liquor is exhausted in about 36 hours, when it is returned to the extraction baths for treatment of fresh ore. Cathodes remain in the bath for about 1 month, when the deposit becomes 1 to $1\frac{1}{4}$ " thick. Product is said to be of greater purity than ordinary electrolytic copper. The process is simple, and requires but a single skilled workman for its operation. Compare with process used at the Bullwhacker and the Butte-Duluth mines of Butte, Mont.

MIHARA MINE.

JAPAN

Owned by Utsonomiya Mining Co.

MINERALS SEPARATION AND DE BAVAY'S PROCESSES.

AUSTRALIA PROPRIETARY, LTD.

AUSTRALIA

Secretaries and offices: E. H. Shackell, 360 Collins St., Melbourne, Aus., and A. O. Williams, 62 London Wall, London, E. C., Eng. W. L. Baillieu, chairman, and A. E. Bright, H. H. Greenway, M. Cohen, J. L. Wharton, directors. Organized June, 1912, capitalization £300,000, shares £1 par; issued, 265,000 shares. Initial dividend of $2\frac{1}{2}\%$ was paid Dec., 1912.

Company was formed to acquire all patents for the processes and apparatus owned and used in Australia and New Zealand, by the Minerals Separation, Ltd., the De Bavay's Sulphide Process Co., Ltd., the Potters Sulphide Ore Treatment, Ltd., and the Amalgamated Zinc, Ltd., and to exploit and investigate flotation processes and patents as may offer, and last but not least, to avoid threatened litigation between the companies thus amalgamated.

MINERALS SEPARATION, LTD.

ENGLAND

Secretary's address: A. O. Williams, 62 London Wall, London, Eng. J. Ballot, chairman and managing director; W. W. Webster, H. A. Krohn, J. H. Curle, S. Gregory and F. L. Gibbs, directors; W. Broadbridge, chief engr.; Sulman & Picard, cons. metallurgists. Organized Dec. 31, 1903, capitalization £15,000, increased Oct., 1904, to £20,000 and again increased Dec., 1905, to £50,000, shares £1 par.

Company owns certain patents for flotation processes and apparatus for the recovery of concentrates from copper, silver, lead and zinc ores, including patents formerly held by the Cattermole Ore Concentration Synd., Ltd. It has sold the rights for Australia and New Zealand to the Minerals Separation and De Bavay's Processes Australia Proprietary, Ltd., which is controlled by the Minerals Separation, Ltd., through ownership of 145,750 shares out of a total of 265,000 shares issued.

MINING EXPLORATION CO.

ARGENTINA

C. S. Nicholson, receiver, 31 Copthall Ave., London, E. C., Eng. Liquidated by court order of Jan. 16, 1912. Former property the Victoria mine and other copper properties, with concession for 45 sq. miles in the Andes, of the Argentine Republic, on the west slope near the Chilean border. Holdings reported transferred 1911, to the New Transandine Synd., Ltd., but no details concerning the new company are procurable. Fully described Vol. X.

MINING & SMELTING CO., LTD.

WALES

Secretary's address: W. Cooling, 10 St. Helen's Place, London, E. C., Eng. Organized Oct., 1911, capitalization £22,900 in 12,000 preferred and 10,000 common shares, par value £1, and 18,000 shares of a par value of 1s.

Property, a copper mine at Drws-y-Coed, Talysarn, Carnarvonshire, Wales, formerly owned by the Complex Ore Co., Ltd., and held under lease by present company.

MINNIE MINE.

CHILE

Mine office: Higuera, La Serena, Coquimbo, Chile. T. H. Everitt, Juan Bade and J. Aldai, owners and managers. Lands, 1 pertenencia, 5 hectares, about 13 miles north of Higuera, showing a vein of 10' width at surface, producing carbonate ore of about 10% average tenor. Mine is opened by 2 adit levels, and ore is sold to Sociedad Minera San Juan.

MITSU BISHI GOSHI-KWAISHA.

JAPAN

Office: Yaesucho Itchome, Kojimachi-ku, Tokio, Japan. Offices and agencies: Yokohama, Nagoya, Handa, Osaka, Kobe, Moji, Wakamatsu, Karatsu, Nagasaki, Otaru, Muroran, Hakodate and Tsuruga, in Japan; Shanghai, Hankow, Peking, Chinking and Hongkong, in China; Singapore, in India; Manila, in the Philippines; London, England, and Glasgow, Scotland. Baron Hisaya Iwasaki, pres.; Baron Koyata Iwasaki, vice-pres.; Kusunyuta Kimura, gen. mgr.; Itsutaro Morikawa, asst. gen. mgr.; Shinji Harada, mgr. metal mg. dept.; Kingo Nambu, mgr. coal mg. dept.; Sadaye Eguchi, mgr. business dept.; Hidemi Maruta, mgr. shipbuilding and engineering dept.; Kumpei Mimura, mgr. banking dept. Organized 1893, capitalization 15,000,000 yen.

The Mitsu Bishi is the foremost private enterprise in Japan, and a worthy memorial to its founder, the late Yataro Iwasaki. Its interests are varied, but are chiefly in mining, shipbuilding and banking.

The company is an important producer of gold, silver, copper and coal, possessing 12 metal mines and 7 coal mines which, in 1912, yielded 1,630 kgs. gold, 24,200 kgs. silver, 23,448,000 lbs. copper, and 2,665,000 metric tons of coal. Mitsu Bishi copper is marketed in 2 forms, as electrolytic ingots and as Arakawa slabs, both branded with 3 diamonds, to insure identification, as it is unsurpassed in purity and electrical conductivity. Practically the entire output is sold in the London market through its agents, Messrs. H. J. Stockton & Co.

The Osaruzawa mines are at the village of Hanawa, Kazuno district, Akita, Japan. Kinjiro Shimamura, supt.; T. Kawamura, asst. supt. Lands, about 1,427 acres. Mines are very ancient, having been opened in the eighth century, but were worked for gold only until about 1650, when cop-

per ores were developed. Ore is chalcocite, chalcopyrite, bornite and a little native copper, associated with pyrite and small quantities of sphalerite, galena and hematite. Occasionally native gold is found mixed with the copper ores and in a quartz fahlband, gold values occurring mainly in the upper workings.

The ore occurs in a complicated system of interlacing fissure veins varying from less than 1' to over 10' in thickness. Their dip is 15°, 45°, 75°, and also in opposite directions. The average width is 3', and the copper content 3 to 4%. Most of the ore is also high in iron pyrite. The veins, which are very persistent in strike, and workable to an average depth of 500', traverse Tertiary shales and tuffs, with intrusive augite-andesite and liparite. Development is by 8 working shafts and 12 main tunnels, with upwards of 17 miles of workings. Equipment includes electrical installations aggregating 1,140 h. p. Forces average about 2,000 persons. Production is at the rate of 70,000 tons ore monthly.

The reduction plant has two 40-ton water-jacket blast furnaces, with a 250-h. p. electric plant, turning out blister copper of 98% tenor, sent to the Osaka Electrolytic refinery. A new ore-dressing house is in the course of erection. During 1,200 years of operation, these mines have produced immense quantities of copper, gold and silver. Recent production is as follows:

Year.	Gold, kgs.	Silver, kgs.	Copper, lbs.
1908.....	16.8	606.7	1,284,269
1909.....	9.6	973.5	1,574,645
1910.....	12.9	1,192.7	2,236,382
1911.....	10.3	966.7	2,005,368
1912.....	11.2	1,310.5	2,188,336

The Arakawa mine is at Arakawa-mura, Sempoku district, Akita, Japan. Shokichi Namura, gen. supt. Lands are about 2,100 acres. Mine is connected with Sakai station on the railway by a 7-mile tram.

Country rocks, Tertiary volcanic sediments and crystalline rock, include augnite-andesite, liparite and propylite, carrying 10 parallel veins in propylite, with strike approximately N. E. and S. W., and workable for 1,000 to 4,000' along their course. Ore consists of chalcopyrite and quartz with a little pyrite, galena and blende. Oxidized ores, mixed with sulphides, averaging about 2 copper, extend down to 500' below surface. The mine is developed by 5 shafts of 300 to 600', and numerous tunnels, deepest workings being at 800' in the lower tunnel. Equipment includes 5 power houses, with aggregate of 4,000 h. p. About 1,900 persons are employed. Ore production is around 5,000 tons per month. Output, including Hisaichi branch, has been as follows:

Year.	Silver, kgs.	Copper, tons.
1908.....	832.1	1,445,854
1909.....	1,341.4	2,027,259
1910.....	1,520.7	2,007,142
1911.....	1,403.2	2,261,227
1912.....	1,369.6	2,030,286

The Hisaichi mine, area 909 acres, at Nakagawa village, about 5 miles S. E. of the Arakawa, is geologically similar to the Arakawa. There are 7 veins, the largest, known as the Ugaisawa, of about 24' average width, carrying about 8' of payable ore, and occasionally branching into several smaller veins. The other workable veins range 5 to 7' in width. The ore averages 3% copper present as chalcopyrite, with oxidized ores, hematite and lead zinc sulphides, and a little gold and silver. There is a 500' shaft. Equipment includes water and electric power installations, and a 50-ton

smelter. Forces average 1,200 hands, producing an output of 4,500 tons of ore monthly, of which 1,200 tons are smelted locally.

The Omodani mine, area 350 acres, is at Kami-Anana village, Ono district, Fukiu prefecture, Japan, 50 miles south of railway at Fukui, and 27 from town of Ono-Machi. This property, opened A. D., 1350, has numerous small veins, none of which exceed 3' in width, impregnating sandstone and altered quartz porphyry. The ores carry bornite, chalcopyrite, spalerite and galena, all argentiferous and having some native silver. Four larger veins, up to 10' in width, showing low-grade ore, are also worked. Ores average about 6% copper and 72 oz. silver per ton. The mine has a shaft, with 5 levels, the longest 12,110', and all aggregating 58,380' in length, with 23,750' of track. Hydro-electric power is used. The working force is around 700 men and the monthly output 1,154 tons of ore, making 23 tons of 97.5% copper. Output for past 5 years is as follows:

Year.	Gold, kgs.	Silver, kgs.	Copper, met. tons.
1908.....	0.225	1,060	227.1
1909.....	1.110	985	201.1
1910.....	1.553	1,256	255.2
1911.....	1.646	1,163	260.6
1912.....	1.346	1,026	239.5

The Ikuno mines, area 10,736 acres, are at Ikuno, Hyogo, Japan. Akira Yamada, general manager. The principal mines of this group are the Tasei, Kanagase, Akenobe and Kasei. There are 4 lesser mines. The Tasei mine has a 14' main vein with numerous branches in quartz porphyry, altered andesite and tertiary tuffs, the ores carrying native gold and silver together with chalcopyrite, galena, zinc-blende and pyrite. This vein is notable for its silver contents and has been the mainstay of the mine for centuries, giving it the name of the silver mine of Ikuno.

The Kanagase mine, near the Tasei, has many veins in quartz trachite, 3 of them being workable. Property is traversed by several basalt and andesite dikes with fault dislocation of the veins along the dikes. The chief copper vein is 8 to 10' in width, runs N.-S., dips 60 to 80° E. and is 10,000' long, carrying native copper, bornite, chalcopyrite and tetrahedrite. Two other veins now being worked are 3 to 9' thick, nearly vertical, minable for 2,000' and hold argentite, sphalerite, galena, ruby-silver and stibnite besides copper sulphides.

The Akenobe mine has numerous copper and tin-bearing veins in Paleozoic slate, scattered along the Akenobe river. Eleven veins are worked, the widths varying from 3 to 40', ores carrying chalcopyrite, bornite cassiterite, wolframite, and blende as by-products. The extent and richness of the tin deposit has been already proven and the output is now of considerable importance.

The Kasei mine shows hornblende gneiss, cut by rhyolite and propylite dikes with fissure veins carrying silver sulphides associated with chalcopyrite and native silver.

Equipment includes steam, water and electric power plant. The copper is shipped in slabs carrying 96.83% copper, .0072% gold and .4742% silver. Output for past 5 years has been as follows:

	Gold, kgs.	Silver, kgs.	Copper, tons.	Tin, tons.
1908.....	132.1	6,742	1,166.6	....
1909.....	291.2	7,604	1,280.6	....
1910.....	207.3	7,750	1,403.6	219.4
1911.....	172.5	7,396	1,488.6	266.6
1912.....	130.4	8,045	1,636.5	378.2

The Kanayama mine, a dependent of the Ikuna property, has 369 acres on the island of Shikoku, across the Inland sea, in the Kita district, an hour's run by steamer from Nagahama. Property shows interbedded lens of cupriferous pyrite, $\frac{1}{2}$ to 10' thick in Archean schists. The bed is flat, workable for 3,000' and yields ore averaging 3.3% copper, 40% sulphur, 950 tons a month being produced and sent to Ikuno.

The Yoshioka mine, area 1,184 acres, is at Fukiyamachi, a small town in Kawakami district, Okayama prefecture, 33 miles from Tatai on the railway. Yaichiro Wakabayashi, manager. Property shows slates, sandstones and phylites cut by porphyrite and quartz porphyry. The ore deposit is divided in two, one part in the sedimentary beds, increasing in richness with depth, the other an impregnation in metamorphic slates of the igneous contact zone; the former shows veins of erratic width netting the rocks. The ore is chiefly chalcopyrite with accessory pyrite, arseno-pyrite, pyrrhotite, galena and blende with a quartz gangue, and averages 3 to 8% copper. The mine has a 360' shaft with 9 levels and a 375' blind shaft. Total development amounts to about 28 miles, the mine employing an average of 1,250 persons and yielding 7,500 tons of ore monthly. The output for the past 5 years is as follows:

	Gold, kgs.	Silver, kgs.	Copper, tons.
1908.....	5.251	1,707.2	822.7
1909.....	3.808	2,253.3	852.6
1910.....	3.933	2,102.6	778.8
1911.....	4.721	1,785.8	766.9
1912.....	4.747	2,090.8	746.6

The Makamine mine, area 1,070 acres, in 4 lots, is at Kitakata village, Higashi-Usuki district, Miyazaki, Japan. Mine is far away from railway lines, but in a well-traveled region. It is accessible by steamer up the Gokase river to Tomi. Country rock is slate with interbedded sandstone and a capping of lava from the Aso volcano. These rocks are cut by veins of small size carrying lenticular ore shoots of cupriferous pyrite, averaging 5% copper, the ore shading into pyrite, pyrrhotite and lievrite. There are 11 main veins whose orebodies are from 10 to 20' wide, though averaging but 1 to 7' and are 30 to 300' long. Development is by tunnels at 50 to 60' intervals with inclined winzes of 310' and 1,000' and a vertical 240' winze. Workings aggregate 23,300'. Equipment is hydro-electric and about 530 persons are employed. Production for the past 5 years is as follows:

	Gold, kgs.	Silver, kgs.	Copper, tons.
1908.....	10.4	138.8	545.59
1909.....	10.5	158.2	516.50
1910.....	9.1	113.0	480.53
1911.....	15.2	136.3	711.46
1912.....	17.5	202.9	675.97

The Osaka metallurgical works are located at Shin-Kawasaki Machi, Kita-ku, Osaka, adjoining the Imperial mint. The works cover 12 acres and employ about 200 hands. The plant has 15 reverberatory furnaces turning out anodes of 97 to 99% purity for conversion into electrolytic copper, cathodes assaying 99.89% copper, 0.0037% silver, 0.014% lead, 0.010% arsenic and a minute trace of sulphur. Gold and silver slimes yielded by the electrolytic separation are washed and dried preparatory to roasting in a small muffle furnace. They are then leached with the waste solution of the refinery to dispose of the remaining copper, the residue being mixed with lead and cupelled.

Production by all mines of the company since 1906 has been as follows:

Year.	Copper, lbs.	Silver, kgs.	Gold, kgs.
1906.....	9,087,860	15,506	567
1907.....	13,103,235	19,084	578
1908.....	10,891,300	17,105	825
1909.....	14,228,075	18,955	1,886
1910.....	15,670,075	20,130	1,741
1911.....	19,758,855	24,568	1,744
1912.....	21,428,730	23,414	1,666

The Mitsu Bishi is one of the 4 large copper mining companies operating in Japan and, like the others, is exceptionally progressive. Success has not been won by the possession of mines of exceptional value, though the company has some excellent properties, but rather by the utilization of the most modern methods and appliances in mining and metallurgy, directed by the best technical skill available.

MITSUI MINING CO.

JAPAN

Mine office: Funatsu, Gifu, Tokio, Japan. C. Tanikawa, superintendent. This is an extensive trading firm and is a producer of coal, coke, sulphur, copper, pig-lead and refined bismuth. The properties are well equipped and handled with technical skill.

The Kamioka mine is primarily a silver-lead mine, but a little copper is secured as a byproduct. Production 1911, was 71,224 lbs. fine copper, 6,751,-334 lbs. lead and 39,714 oz. silver. The mine employs 615 workmen and has a 568-h. p. steam power plant and 41-kw. electric plant.

MITTERBERGER KUPFER-AKTIENGESSELLSCHAFT. AUSTRIA

Office: Schulhof 6, Vienna, Austria. Mine office: Mühlbach bei Bischofshofen, Salzburg, Austria. Employs 200 men. Arthur Krupp, pres.; Ludwig Neurath, vice-pres.; preceding officers, Dr. Horace Ritter von Landau, Arthur von Escher, Dr. Paul Mann and Julius Stern, directors.

Organized Oct., 1908, under laws of Austria as successor of Mitterberger Kupfergewerkschaft, capitalization 1,400,000 crowns, increased, Dec., 1909, to 2,100,000 crowns, shares 200 crowns par, fully paid. Fiscal year ends June 30.

Lands, 10 mining claims, 800 hectares, 15 miles from Bischofshofen, and about midway between Salzburg and Innsbruck, in the Austrian Tyrol. The property shows Silurian and Cambrian schists, limestone and dolomite, carrying 6 parallel veins, the principal veins, known as the Josephi, Johanni and Marien, being of 6 to 9' average width, with E.-W. strike and average dip of 68°, traceable 4,000 meters. These veins carry auriferous, argentiferous and slightly nickeliferous chalcopyrite, associated with pyrrhotite, arsenopyrite and siderite, with quartz gangue. The veins do not carry continuous values, there being only 1 payable lode in any given cross-section, ore shoots switching from 1 vein to another, at intervals. The veins carry high values in stringers of 1 to 30" width, with balance payable throughout the vein at points mineralized, ore being reported to average about 3% copper. The Mitterberger group, discovered and opened 1827, includes the Einöden, Buchberg and Heidberg mines, and has extensive underground workings, with shafts of 268, 182 and 25 meters depth, and tunnels of 1,666, 2,343, 3,640, 3,220, 570, 300, 250, 620, 180 and 450 meters length, the mines as a whole having upwards of 8 miles of workings.

Equipment includes 2 electric hoists, good for 400 meters depth each, and 2 air compressors, of 32 drills aggregate capacity, with 38 air drills and 20 electric drills, 5 of the latter being of Temple and 15 of Siemens-Schukert make. Installations include electric plants of 530 h. p., water plants of 770 h. p., and gasoline plants of 225 h. p., with 255 h. p. used at the mine, 225

h. p. at the mill and 430 h. p. at the smelter. There are 21 mine buildings and 3 sawmills.

There are several small concentrators at the portals of different tunnels, at Ausserfelden, near the smelter, the main concentrator having 2 Blake crushers, 5 sets of rolls, 24 Hartz jigs, 13 Ferrari tables, 4 Ullrich electromagnetic separators, a Wetherill magnetic separation plant and a 45-ton Elmore vacuum oil flotation plant.

The smelter, at Ausserfelden, near the main mill, and 4 miles from the mines, receiving ore by wagon, is of 50 metric tons daily capacity, equipment including 8 Stoffel calciners, two 9-ton reverberatory furnaces, and 20-ton and 30-ton water-jacket blast furnaces. First-fusion product is a 40% matte, which is refined to blister copper of 98.6% average tenor in 8 one-ton Manhés converters. The smelter does custom work, and in connection there is a small refinery. Property considered valuable, and management good.

MIZUSAWA MINE.

JAPAN

See Furukawa Mining Co.

MONA & PARYS MINES, LTD.

WALES

Secretary's address: R. Bridson, Anglesey, Wales. Mine office: Mona, Amlwch, Anglesey, Wales. G. H. Cartland, T. Fanning Evans and R. W. Rücker, directors; Midland Trust Co., Ltd., Birmingham, trustee for debenture holders. Organized Jan. 13, 1899, under laws of Great Britain, with capitalization £75,000, shares £1 par; issued £58,000. Debentures £15,000 first-mortgage bonds at 6%, and £10,000 second-mortgage bonds at 7%, with interest in arrears.

Company owns the Mona, Parys Mountain and Morfa Du mines, formerly the most important copper producers of Wales. Property, 1,067 acres, including old copper mines, ochre mines and color-works plant at Amlwch, tramways and improved water frontage. Mines were worked in this district by the Romans. The Parys mine was opened 1768, and made 3,000 long tons of copper in 1784, at that time being perhaps the largest copper producer of the world. Present production is only 25 to 50 tons fine copper yearly, secured, as precipitate, by leaching mine-waters from the old and idle workings.

MONS CUPRI, LTD.

WESTERN AUSTRALIA

Secretary's address: H. Bacon, 62 London Wall, London, E. C., Eng. Mine office: Whim Creek, Pilbarra, Western Australia. G. B. Elkington, chairman; E. Anderson, W. S. Wilson, H. Pinckney and J. Conchie, directors; H. R. Sleeman, cons. engr. Organized Nov. 29, 1910, capitalization £150,000, shares £1 par; issued £103,807.

Lands, 130 acres leasehold, about 3 miles S. W. of the Whim Well Copper Mines, developed by several shallow shafts and opencuts. Ores average about 5% copper.

Company was planning 1913, a 100-ton concentrator and the erection of a 5-mile tramway to connect with the Whim Well tram.

MONTACUTE GOLD & COPPER MG. CO.

SOUTH AUSTRALIA

Office: Adelaide, So. Australia. R. H. Williams, manager. Property is a copper-gold prospect, on Sixth creek, about 10 miles from Adelaide, developed by several shallow shafts and tunnels, showing ferruginous slate, quartzite and quartz and iron veins carrying small patches of copper sulphides and iron pyrites. A 110' shaft discloses high-grade copper ore in 2 parallel veins, picked samples assaying up to 12% copper and \$8 gold per ton.

Property considered promising, but company is out of funds and idle, at last accounts.

MONTE RUBIO MINES.**SPAIN**

Owned by Sociedad Colectiva C. y J. Sundheim, at Puebla de Guzmán, Huelva, Spain.

MONTECATINI; SOC. ANONIMA DELLE MINIERE DI.**ITALY**

Office: 49 Piazza Santa Apostoli, Rome, Italy. Mine offices: Boccheggiano and Massa Marittima, Tuscany, Italy. Works office: Leghorn, Tuscany, Italy. Paolo Marengo, general manager. Organized 1888, under laws of Italy, capitalization 5,000,000 lire, increased 1906, to 6,500,000 lire, shares 100 lire par. Paid dividends, 1899-1902, of 82 lire per share.

Lands include the Montecatini, Boccheggiano, Capanne Vecchie, Fenice Massetana and Val di Nievole mines, all very ancient properties, worked successively by the Etruscans, Romans, Goths and Italians. Principal properties are about 20 miles from Massa Marittima, the nearest rail station, on the Mediterranean railway.

The Boccheggiano mine, which is the principal producer, has a fault vein between micaceous Permian shales and Eocene limestone, of 13 to 16' width, with dip of about 50° E., carrying paystreaks, along the hanging wall, of chalcopyrite, associated with pyrite and occasional hematite, with quartz gangue. The ore in the southern end of the mine is mainly zinciferous, slightly plumbiferous, and carries about 0.05% tin. There also are occasional veinlets of highly argentiferous tetrahedrite. Development has been difficult on account of the heavy inflow of thermal waters at a temperature of 105° F. The reduction plant of the Boccheggiano is at Montieri, Tuscany, Italy.

The Montecatini mine proper has a brecciated red porphyry, carrying occasional native copper and some massive sulphides, but mainly disseminated chalcopyrite, bornite and chalcocite, ores averaging about 3.5% copper as mined. The Montecatini has steam power and a concentrator with 5 crushers.

The Capanne Vecchie and Poggio Bindo mines are ancient properties, reopened 1846, since which time they have been small but steady producers. The principal vein is 6" to 50' in width, ore being mainly chalcopyrite, which is assorted into first-grade smelting ore of about 10% copper tenor, and second-grade ore carrying about 3% copper only, which is heap-roasted and leached. There is a mill.

The Fenice Massetana mine, also at Massa Marittima, shows orebodies of 6" to 65' width, apparently lenticular, carrying chalcopyrite associated with pyrite, in a quartz gangue, with occasional sulphides of higher grade. The high-grade ore, averaging 10% in tenor, is heap-roasted at the mine and smelted at Leghorn, and second-grade ore, averaging about 3% copper, is heap-roasted and leached at the mine. Equipment includes a concentrator.

The Val di Nievole mine carries low-grade ores that can be worked profitably only when copper prices are high, and this property has been idle for several years.

The smelter at Leghorn has 4 reverberatory furnaces and a converter plant. In connection with the smelter is a sulphuric acid plant for the utilization of the sulphur fumes, the low-grade ores of 3.5% copper tenor averaging about 40% sulphur contents.

Property is one of the best known and most productive mines of Italy.

MORADO; SOCIEDAD ESPLORADORA DEL.**CHILE**

Office and mine: Freirina, Atacama, Chile. Organized Dec. 22, 1906, under laws of Chile, capitalization 500,000 pesos, shares 20 pesos par. Property is Las Arenillas mine, in an undeveloped district, said to have been opened 1860, but upon which very little work was done until taken over by

the present company. Has a machinery plant and was planning to build a small matting furnace, at last accounts.

MORFA COPPER WORKS.

WALES

Works office: Swansea, Glamorganshire, Wales. Property is a zinc and copper smelter at Middle Bank and at Upper Bank, Landore, near Swansea. Is controlled and operated by Henry R. Merton & Co. and the Metallurgische Gesellschaft A. G.

MOROCHOA MINING CO.

PERU

Office: Morococha, Junin, Peru. Incorporated 1908, under laws of New Jersey, capitalization \$10,000,000. Company is a subsidiary, formed by the New York interests of the Cerro de Pasco Co., prior to the settlement of litigation with the Socavon del Cerro de Pasco.

Property, the Gertrudis, San Francisco and San Miguel mines and a one-half interest in the Natividad mine, which is owned jointly with the Backus & Johnston Co.

The Mina Gertrudis, opened 1897, is on the Cerro San Marcello, shortly west of Lake Morococha. Property shows 3 limestone beds having ore impregnations following the bedding planes, and a vein with strike of N. 51° E. and nearly vertical dip of about 2 meters average width, with a paystreak of 60 cm. to 1 meter, carrying gray copper and chalcopryrite averaging about 14% copper and 1,000 grams silver per metric ton, balance of vein carrying about 5% copper and 300 grams silver per metric ton. The mine has a 12-meter shaft, but is developed mainly by a tunnel, just above the level of Lake Morococha, mining through winzes sunk from short cross-cuts in the hanging. Ore is hand-cobbed at the portal of the tunnel.

The Natividad mine is opened to about 300 meters depth, developing a vein about 4' wide, carrying ore averaging about 14% copper and 14 to 70 oz. silver per ton. A new tunnel, planned to be 750 meters long, is being driven under the old workings.

The Mina San Miguel is developed by the Copaycocha and Vulcano tunnels, lower of about 500 meters length, and ore is mainly enargite, with some tetrahedrite and tennantite, associated with pyrite. Mine was opened 1894, and in 10 years produced from ore averaging about 20% copper and 333 grams silver per metric ton, 6,476,400 kgs. fine copper and 10,794 kgs. fine silver.

The San Francisco is being opened by a 4,000' tunnel, about one-half completed, Sept., 1913, known as the Carlos Reynaldo adit.

Production is gradually increasing, and early 1913, was about 7,000 tons of ore monthly, which was being shipped to the Cerro de Pasco smelter.

Transportation facilities are poor and a railway is badly needed, which if given, will result in a material increase in production. The property is one of considerable promise and great potential value.

MOROTAKA YAKATA.

JAPAN

Owns the Kinjodani mine in Yehime, Japan, employing 88 persons and producing 272 tons of ore in 1911, valued at \$6,464.

MOTALE COPPER DEVELOPMENT SYND., LTD.

TRANSVAAL

In liquidation. Office: 43 Commercial Exchange, Johannesburg, S. A. Operated 1911, with poor success, near Motale, North Transvaal, and has allowed all options, held in that field, to lapse.

MOUNT BABINDA MINE.

QUEENSLAND

A copper prospect, in the Heberton field, Queensland, developed by 36' shaft, showing a 6" seam of argentiferous ore, said to average 25% copper.

MOUNT BALFOUR COPPER MINES, N. L. (No. 2).

TASMANIA

Office: 395 Collins St., Melbourne, Aus. Mine address: Mt. Balfour,

Russell Co., Tasmania. J. H. Opas, manager. Organized 1910, capitalization £151,000, increased Feb. 20, 1913, to £250,000, shares £10 par; issued £200,000.

Lands, 448 acres, including the Chesters Reward mine, long the main copper lode of the Mt. Balfour district, 50 miles from the port of Stanley. Country rock is laminated sandstone, in places interbedded with slate, and on the eastern side of the property is a belt of black slate, carrying some large quartz veins up to 70' in width, traceable several miles. Principal vein, carried for 5,000' on the company's lands, is developed by a 321' tunnel and 91' shaft, all in copper ore, with some drifting, and by shallow surface trenches showing 3 to 10' of ore carrying melaconite and chalcopryite, with gangue of graphitic slate and quartz, giving average assays of 2.4% copper, with small gold and silver values, and up to 12% copper from selected samples.

Company also has the right to build a railway from the mines to the port of Stanley, with full power to collect and retain tolls, build wharves and docks at Stanley and to control all shipping making use of these. The concession has a tenure of 50 years. Construction of the railway, which will have a length of about 50 miles, including 37 miles traversing rich agricultural lands, was begun early 1912. Property considered promising.

MOUNT BALFOUR PIONEERS, N. L.

TASMANIA

Office: 352 Collins St., Melbourne, Aus. Letter unclaimed at Mt. Balfour, Russell Co., Tasmania. Property, of little promise, was abandoned at shallow depth, on account of a heavy inflow of water. Idle several years and company dormant.

MOUNT BALFOUR PROSPECTING & MG. CO., N. L.

TASMANIA

Office: 352 Collins St., Melbourne, Aus. Mine office: Mount Balfour, Russell Co., Tasmania. Hal Sheppard, chairman. Mine has 2 tunnels, No. 1 showing a vein of bull quartz, carrying pyrite and specks of chalcopryite. No. 2 tunnel was said to show grains of native copper. Considerable surface work has also been done. Presumably idle.

MOUNT BOPPY BLOCK NO. 51, N. L.

NEW SOUTH WALES

Mine address: Mt. Boppy, Mouramba Co., N. S. W., Aus. Property held under option from the Mt. Boppy Copper Mining Co., N. L., is situated one-half mile south of that company's main shaft. Development is by a 200' shaft, showing a contact deposit between porphyry and micaceous sandstone, said to give average assays of 15% copper. Ores are mainly chalcocite and melaconite, high in iron content. Property considered promising.

MOUNT BOPPY COPPER MINING CO.

NEW SOUTH WALES

Office: Cobar, N. S. W., Aus. Mine office: Mount Boppy, Mouramba Co., N. S. W., Aus. J. P. Conley, chairman; G. Marshe, sec.; C. J. Elliott, gen. mgr. Organized Nov., 1906, under laws of New South Wales, capitalization £25,000, shares 12s. par; fully issued.

Owens the Burra Burra mine with 3 claims, 120 acres, held under a mineral lease; also a 4-acre mill site and 100,000 acres of timber land in the Geweroo district 4 miles from Canbelego and 6 miles south of Mt. Boppy, the nearest rail point. The Burra Burra, opened 1886, was worked spasmodically until taken over by the present company, Nov., 1906. The property shows 2 contact deposits between slate and porphyry, of about 6' average width, carrying malachite, chalcopryite, bornite, tetrahedrite and sphalerite, said to average 8% copper, 20 oz. silver and 2 dwts. gold per long ton. Development is by shafts of 200' and 300', and tunnels of 100' and 300'.

Equipment includes a 100-h. p. steam plant, with a 16-h. p. hoist, and there are 4 buildings, including a general office, assay office and mill, the latter of 50 long tons daily capacity, having 15 gravity stamps, 3 Alley tables,

1 Wilfley table, 1 Frue vanner and 3 slime tables. Mine was being worked by tributors, at last accounts.

MT. BROWNE COPPER & GOLD MG. CO. NEW SOUTH WALES

Office: Karangi, Fitzroy Co., N. S. W., Aus. P. Kritsch, manager. Organized 1908, under laws of New South Wales, capitalization £35,000, shares £1 par. Lands, in the vicinity of Goff's Harbor, are developed by a short tunnel and a shallow shaft, opening a 10' vein with a 2' paystreak, carrying copper carbonates and tetrahedrite, averaging about 12.5% copper. Equipment includes a 20-h. p. boiler, and a Blake pump. Is idle.

MOUNT BULGA COPPER CO. NEW SOUTH WALES

Address: N. Murray, Sydney, N. S. W. Mine and works office: Springfield, Bathurst Co., N. S. W., Aus. W. H. Trewenack, consulting engineer. Lands, 113 acres, at Mount Bulga, 9 miles east of Orange, well watered and with an ample timber supply available. The mine, discovered 1893, carries sulphide ore assaying up to 14.5% copper, found as impregnations in bands up to 25' in width, interbedded with slate. Development is by a 310' main shaft, having a hoist.

The old smelter, built 1902, was replaced 1910, by a new smelter having a 30-ton water-jacket blast furnace and blower. Several thousand tons of ore have been stoped from the 200' level, by the present and former owners. Temporarily idle, 4 months' suspension of the labor conditions being granted by the Mine Warden at Orange, to give time to raise fresh capital for development.

MOUNT CANNINDAH COPPER MINES, LTD. QUEENSLAND

Idle. Office: 280 Elizabeth St., Brisbane, Queensland, Aus. Mine address: Mount Cannindah, Bowen Co., Queensland, Aus. Hon. Robt. Philp, chairman; J. D. Campbell, Sir A. S. Cowley, Alex. Corrie and E. E. Tyler, directors; Thos. Welsby, sec., at last accounts. Organized 1906, under laws of Queensland, as a reconstruction of Mount Cannindah Copper Co., capitalization £30,000, increased later to £36,000, shares 2s. par; fully issued and fully paid.

Lands, 97 acres, carrying ore in brecciated dikes running through slates, in Gympie beds of upper Devonian age. The N.-S. Mount Cannindah dike has an extreme width of 110', with oxidized and sulphide ore carrying chalcocite and bornite, in a gangue of kaolinized slate, rich portions running 35 to 40% copper, but as a whole averaging about 2 to 3% copper. The main shaft is 190' deep.

The mill, with a rated capacity of 50 long tons daily, has a crusher, Krupp ball mill, Wilfley sand and slime tables, jigs and classifier, turning out concentrates of 20 to 35% copper tenor, with tailings assaying about 1% copper, held for leaching later.

The smelter, of about 25 tons daily capacity, has a 19x13' 6" reverberatory furnace, fired with ironbark wood. The McMurtry sintering pot process for desulphurizing concentrates before smelting was employed, with satisfactory results.

Company, apparently alive, but inactive. Property shut down since 1908.

MOUNT CARDWELL MINE. QUEENSLAND

At Nymbool, Cardwell Co., Queensland, Aus. See Mt. Molloy, Ltd.

MT. CARRINGTON COPPER MINES, N. L. NEW SOUTH WALES

Mine address: Drake, Clarence Co., N. S. W., Aus. Geo. Young, manager. Capitalization £10,000, shares 5s. par; issued 30,000 shares.

Lands, 65 acres, including the old Pioneer mine, 25 acres being held under lease, on the slopes of Mt. Carrington, 32 miles from Tenterfield and the railway.

Development is by a 1,200' tunnel, and several old shafts, deepest 180',

showing 4 veins, ranging from 1 to 5' in width, and variously carrying 10% and 3% copper, 2 oz. silver and \$3 gold per ton, up to 15% copper and \$5 combined gold and silver values.

Practically all ore above the 180' level in the Pioneer workings has been stoped out, and there are no definite ore reserves developed by the newer openings, excepting possibly 4,000 tons, which ore is estimated to carry an average of 6% copper.

MOUNT COFFIN COPPER MINE.

NORTHERN TERRITORY

Mine address: Leigh Creek, Northern Territory, Australia.

Property, 8 miles N. E. from Leigh creek, is developed by several shallow shafts and inclined tunnels, to a depth of about 80'. Country rock is a clay slate. Ores are mainly malachite and tetrahedrite, in veinlets and seams ranging from a few inches up to 3' in thickness. Idle since 1883, except for occasional work done by tributors.

MOUNT COSTIGAN & CORDILLERA CO.

NEW SOUTH WALES

Mine office: Mount Costigan, Georgiana Co., N. S. W., Aus. The mine, discovered 1880, was worked for silver-lead to depth of about 200', until 1889, when the mining and smelting plants were dismantled. It was reopened 1906, by present company, for copper ores below the water level. The mine has a vein of about 4' width, carrying mixed sulphides of copper, lead, zinc and iron, all argentiferous, similar to the silver ore in the lower levels of the Sunny Corner silver mine. Assays of ore have shown 12 to 20 oz. silver and 2 dwts. 4 grains gold per long ton. Company has apparently sold the mine to a new syndicate Sept., 1913, retaining an old shareholder as manager.

MOUNT CUTHBERT, N. L.

QUEENSLAND

Office: 39 Queen St., Melbourne, Aus. British office: Palmerston House, London, E. C., Eng. Mine office: Cloncurry, Queensland, Aus. P. Pigott, chairman; Hon. R. Philp, T. P. Power, F. E. Power, J. L. Wharton, J. Forsyth and E. L. Baillieu, directors; Edwin Habben, London sec.; R. W. Powell, mine mgr.; W. H. Corbould, cons. engr. Organized Feb. 21, 1907, under laws of Victoria, capitalization £240,000, shares £1 par, and re-organized Oct., 1909, under laws of Victoria, with same capitalization, shares £1 par; issued, 159,330 shares. Debentures, £140,000; issued £53,400, of which amount £30,000 was subscribed Sept., 1913, with privilege of conversion into stock until Dec. 27, 1914.

Lands, 33 leases, 449 acres, in the Mt. Cuthbert district, 80 miles from Cloncurry. Property shows several orebodies in a schistose formation, of which 7 under development show widths ranging from 2 to 8', traceable 700' and are reported to carry average values of about 8% copper and 50 cts. to \$2.50 gold per ton. Ores carry azurite, melaconite and cuprite, with some bornite in depth.

Principal development is on the Cuthbert and Kalkadoon leases, former opened by shafts of 401', 80', 80' and 30'. The Kalkadoon has a 170' shaft, now sinking, and another of 75', with a total of about 6,140' of workings. Ore reserves in the Cuthbert mine are estimated at 220,000 tons of about 7% copper tenor. The Warwick Castle lease has shafts of 106', 76' and 35', and the Surprise lease has shafts of 100' and 80'. The Mighty Atom and Little Wonder leases are slightly prospected, the B shaft of the former being 62' deep with 3' of 20% ore and the C. shaft 90' deep showing 3' of 25% ore. A new shaft is to be sunk 200' at once.

Equipment includes a 230-h. p. steam plant, with 5 hoists and a 6-drill air compressor. There are also 14 buildings including a sawmill, smithy and 4 stores.

A smelting plant is under consideration and rail connections with the Cloncurry railway is in good prospect.

MOUNT DIAMOND MINE.**NORTHERN TERRITORY**

Mine office: Wandie, Northern Territory, Australia. Property, 240 acres, leasehold, 5 miles N. E. of Wandie, formerly held by the Mount Diamond Corporation, Ltd., having a vein of about 40" average width, said to be traceable 900'. Mine is opened to a depth of 200', and for a length of about 450', the 200' level south drift showing a 3' vein of ore carrying chalcopryite associated with pyrite, in quartz gangue, estimated to average about 8% copper.

MOUNT ELLIOTT, LTD.**QUEENSLAND**

Office: Palmerston House, London, E. C. Eng. Australian office: 39 Queen St., Melbourne, Aus. Mine office: Mt. Elliott, Cloncurry, Beaconsfield Co., Queensland, Aus. Wm. Clark, chairman; P. I. Becker, R. H. Henning and W. D. Reid, directors; Hon. W. L. Baillieu, chairman; G. W. W. Mackinnon and W. S. Robinson, directors Australian board; F. G. Hughes, sec.; Edwin Habben, London, sec.; W. H. Corbould, gen. mgr.; H. P. Richards, mine supt.; E. A. Weinberg, cons. engr.

Organized 1906, under laws of Victoria, and reorganized June 14, 1907, under laws of Great Britain, capitalization £750,000, shares £5 par; issued, £737,590, fully paid. First dividend, 10s., was paid April, 1911, and total dividends to March 1, 1913, were 52s. 6d. per share.

Lands, 803 acres, in several groups, from 58 to 72 miles south of Cloncurry, including the Mt. Elliott mine of 300 acres, the Selwyn of 90 acres, the Trafalgar of 93 acres, the Kings Cross of 10 acres, the King Solomon of 160 acres, the Consols of 40 acres and the Floradora, Albion and Revenue mines aggregating 110 acres; also working options and leases in the neighborhood of the Trafalgar mine, options on the Castle Mountain mine, the Danube mine and on various parcels of land 38 miles west of Cloncurry.

The Mt. Elliott property shows a big outcrop of good ore in an area of upturned pre-Devonian slates and schists, ore occurring in lenticular masses, the main lens being of 50 to 60' width, and about 220' in length, with good ore proven by the diamond drill to a vertical depth of 600'. The upper workings show cuprite and considerable chrysocolla associated with limonite and siderite, succeeded by chalcocite and chalcopryite associated with small quantities of pyrrhotite. Ore reserves were estimated by the management, June, 1912, at 85,000 long tons, averaging 10% copper and 350,000 tons averaging about 3% copper.

The mine is developed by a 125' vertical shaft and a 520' incline shaft, in addition to which there are some opencast workings. The first level is at 125', and second at 185', with levels at 100' intervals thereafter, the 385' level being reported to show 3 parallel lenses of sulphide ore, narrow, but of good average grade. The mine made 2,460' of new openings, 1912, and ended 1913, with about 2 miles of workings.

In 1913, company was actively developing its outlying properties. The 148' and 140' Trafalgar shafts show ore on the newly opened 110' level. The 113' Kings Cross shaft shows 6' of silicious ore with 13% copper. The King Solomon has ore in limestone opened by 2 shafts and the Revenue mine has been equipped with steam hoist, unwatered and developed.

Property is reached by a 72-mile railway line from Cloncurry.

Equipment includes a 150-h. p. steam plant at the mine, with 25 and 50-h. p. hoists, good for 300' and 600' respectively, and two 10-drill Ingersoll air compressors. There are about 20 mine buildings, including a 25x30' machine shop, 25x30' smithy and a sawmill.

Smelting was suspended March 19, 1913, owing to labor troubles, and resumed in August, treating 3,596 tons in 25 days and producing 857,024 lbs. fine copper, 649 oz. gold and 1,006 oz. silver.

The smelter, which is one of the most complete in Queensland, has steel-frame buildings, with a water-jacket blast furnace of about 200 tons daily capacity, blown in Sept. 29, 1910, and operated electrically throughout. There are 3 converter stands with 60x96" shells of Leghorn type.

Production for fiscal year ended June 30, 1912, was 39,933 tons of ore, yielding 5,243 tons copper, 9,419 oz. gold and 7,320 oz. silver. Property considered promising and management good.

MOUNT FEDERAL MINE.

QUEENSLAND

Address: Cloncurry, Queensland, Aus. Wm. Orr, owner; A. M. Hogarth, supt. Property, 22 miles west of Cloncurry, is developed by 4 shafts, deepest 150', showing replacement deposits. Ore is mainly bornite of about 50% copper tenor. A traction engine, hauling 20-ton loads transports ore to the smelters.

MOUNT FLORA COPPER CO.

QUEENSLAND

Idle. Mine office: Mackay, Carlisle Co., Queensland, Aus. Lands include three 100-acre tracts known as the Mount Flora, Wallaroo and Eastern Selections mines, also the Fairview mine. The Wallaroo has several copper veins, including 1 of 18' reported average width, carrying to shallow depth melaconite, azurite, malachite and occasional native copper, succeeded by chalcopryrite. The Wallaroo has a 140' shaft and has shipped ore ranging 15.5 to 43.5% in copper tenor. The Fairview mine has a 265' tunnel showing a vein of 80' estimated average width, carrying a hanging-wall paystreak of good ore.

MOUNT GLANCE MINE.

QUEENSLAND

Address: Mt. Elliott, Cloncurry, Queensland, Aus. Messrs. Stuart and Wastyn, owners. Mine, 14 miles south of Mt. Elliott, is opened by 2 shafts of 50' and 35', showing occasional pockets of ore.

MT. GODKIN CONS. COPPER MINES, N. L.

QUEENSLAND

Property sold to Era Mining Properties Development Syndicate, Ltd.

MOUNT GORDON COPPER CO.

QUEENSLAND

Office: Cloncurry, Queensland, Aus. Capitalization £1,600, shares £1 par. Property consists of sundry mineral leases in the Cloncurry district. No trace of operations securable.

MT. GUNSON PROPRIETARY MG. CO., N. L. SOUTH AUSTRALIA

Office: Grenfell St., Adelaide, South Australia. Mine office: Pernatty Lagoon, South Australia. Works office: Port Augusta, South Australia. Lands, 460 acres, 1 mile west of Pernatty lagoon, 5 miles S. E. of Mount Gunson and about 90 miles N. W. of Port Augusta. The mine, discovered 1875, and worked in an exceedingly small way before the present ownership, has 2 practically parallel veins, with N.-E. strike, of 6 to 14' estimated average width, having 6" to 3' paystreaks carrying malachite, azurite and tetrahedrite, giving average assays of about 26% copper, with intermediate bands of low-grade ore. The old mine shows carbonate impregnations, apparently occurring as infiltrations, in practically horizontal veins in quartzose sandstone, and in jointing planes and cracks that carry copper carbonates and chalcocite as crusts and films. Considerable trenching and test-pitting has been done, over an area one-half mile wide by 1½ miles long.

The smelter, built 1905, with 1 reverberatory furnace, is 90 miles from the mine. The ore is highly silicious, and the iron ore used for fluxing also being silicious, caused much trouble in smelting. A new plant, for experimental purposes, was in the course of erection, 1912.

MOUNT HECTOR COPPER MINES, LTD.

QUEENSLAND

Idle. Office: Brisbane, Queensland, Aus. Mine office: Glassford Creek, Bowen Co., Queensland, Aus. Thos. Gibb, managing director; Thos.

Welsby, sec. Company was organized with capitalization £25,000, shares £1 par, and reorganized 1907, with capitalization £25,000, shares 5s par.

Lands formerly were 346 acres, including the Monument, Furnace and Welch leases, 7 miles north of Glassford creek and 29 miles from a railway, in the Monal goldfield, but all leases excepting the Welch, upon which the smelter stands, have been abandoned. Lands show rocks of Devonian age, carrying auriferous and slightly argentiferous copper ores, with fluxing material on the property.

The smelter, connected with the mine by a ground tram, has a crusher and one 20-ton reverberatory furnace, making matte of about 55% copper tenor, but the reverberatory was dismantled and a 50-ton water-jacket blast furnace blown in, August, 1908.

MOUNT HOPE COPPER MINES CO.

QUEENSLAND

Mine office: Cloncurry, Beaconsfield Co., Queensland, Aus. Organized 1906, under laws of Queensland, capitalization £30,000. Lands, leasehold, include the Mount Hope, Mount Hope North, Regina and Aurum mine. Idle since 1908, except for prospect work, which has proven disappointing.

MOUNT HOPE MINES, N. L.

NEW SOUTH WALES

Office: 114 Pitt St., Sydney, N. S. W., Aus. Mine office: Mount Hope, Blaxland Co., N. S. W., Aus. H. Ernest A. Miller, agt.; J. M. Rees, legal mgr. Organized 1908, as a reconstruction of Mount Hope Copper Proprietary, which was a reconstruction of Mount Hope Copper Mining Co., N. L., which also was a reorganization of a preceding Mount Hope.

Lands, about 600 acres, freehold, well watered, about 90 miles south of Cobar and 80 miles west of Condobolin, the nearest rail point.

The mine, discovered 1878, opened 1880, has had a somewhat checkered career, having been closed and reopened fully a half-dozen times. The property is reported by the management to have produced upwards of £600,000 worth of copper, to the end of 1901.

The property shows altered sandstone, carrying 3 parallel veins of close-grained ferruginous slates, seamed with quartz veinlets carrying ore. The oxidized zone, extending to a depth of about 160', carries mainly earthy malachite and azurite, with occasional cuprite, succeeded by sulphides, with clean sulphide ore of 4.5% to 7% copper tenor below a depth of 370'. The ore shades into the walls, which are impregnated for some distance, the main orebody having an extreme width of 80' and resembling the Great Cobar mine in several respects. Former workings were mainly in the oxidized zone, but the last mining was done at depth, in sulphides. The mine has a 320' main shaft, showing, on the bottom level, a 30' vein, and has some stopes of 30 to 50' width, ore shoots being up to 200' and 300' in length.

Equipment includes a fair machinery plant at the mine. The mill has Hancock jigs, making concentrates of 15 to 25% copper tenor.

The smelter has 5 small reverberatory furnaces. Iron ore for fluxing is secured from a quarry 12 miles from the mine. Idle since 1908.

MOUNT JASPER COPPER MINES, N. L.

TASMANIA

Idle. Office: 325 Collins St., Melbourne, Aus. Mine office: Heazlewood, Russell Co., Tasmania. J. H. Opas, legal manager. Capitalization £12,000, shares £5 par; issued, £10,500.

Lands, in 2 groups, including the Mt. Stewart mine, are on the Whyte river, in a very rugged, but well-timbered section. Country rock is serpentine and ores carry chalcopyrite and pyrites in the Mt. Jasper mine and silver-lead ores in the Mt. Stewart. The Mt. Jasper has 2 tunnels and a shallow shaft, and the Mt. Stewart has shafts of 200' and 45' and a 114' tunnel.

MOUNT LYELL BLOCKS COPPER MINES, N. L.

TASMANIA

Secretary's address: T. Rollason, Queen St., Melbourne, Aus. English

office: Palmerston House, London, E. C., Eng. Mine office: Linda Valley, Montagu Co., Tasmania. Colin Templeton, Alfred Tolhurst, Thos. Harvey and Alex. Campbell, directors; Edwin Habben, London sec.; Robert Ferguson, gen. mgr. Organized June 20, 1910, as a reconstruction of Mount Lyell Blocks Mining Co., N. L., which in turn was a reconstruction of Mount Lyell Blocks Copper Corporation, Ltd. Capitalization £300,000, shares £1 par; fully issued, 18s. 6d. paid in.

Lands, 317 acres, including 17 acres held under mineral lease, 60 acres timber lands, 150 acres miscellaneous lands and a mill site, and in addition the company has the right to mine on adjoining lands of the Mount Lyell Consols, for 7 years, on a royalty of 40% of net profits.

The property has 2 low-grade orebodies, consisting of native copper, in minute particles, disseminated quite evenly, through argillaceous schists, locally termed clays, as the schists are very soft and weather readily. These orebodies are estimated to carry about 1½% copper. The property also shows sulphide ores giving assays upto 6% copper in a 30' bed of conglomerate. No work has been done on these beds for some years.

Development is by the 1,200' Main shaft, 240' Balance shaft, the 680' Office tunnel and the 2,255' Consols tunnel, latter connecting with the Main shaft on the 450' level. Ore reserves, Dec., 1910, estimated at 60,000 tons. The ground is very soft and is exceedingly treacherous, requiring heavy timbering.

Equipment includes steam power and an air compressor. There is a small sawmill, with a framing mill for mine timbers. Fuel is wood, costing 10s. per cord. Nearest railway is the Mount Lyell & North Mount Lyell line, 5 miles distant.

A 350-ton steel frame concentrator has 10 gravity stamps, 20 Wilfley and Phoenix-Weir tables, canvas tables and 12 Frue vanners. The mill gave very unsatisfactory results at first, but, after minor changes did fair work, the ore being concentrated easily, but yielding small returns because lean.

The mine formerly employed about 250 men, but has secured no production since 1907. Was developing, with a small force, Sept., 1913.

MOUNT LYELL COMSTOCK COPPER CO. LTD. TASMANIA

In liquidation. C. A. Sack, liquidator. Property sold 1912, to Mount Lyell Mining & Railway Co., (which see). Fully described Vol. X.

MOUNT LYELL CONSOLS WALLAROO

COPPER MINES, N. L.

SOUTH AUSTRALIA

Secretary's address: T. Rollason, 31 Queen St., Melbourne, Aus.; London secretary, E. Habben, Palmerston House, E. C. Mine office: Kadina, Daly county, So. Australia. J. A. Wauchope, gen. mgr.; T. C. Dunster, chairman; S. Cherry, W. P. Jarvie, E. J. Hartley and C. B. Holland, directors.

Organized Nov. 20, 1911, as a reconstruction of Mount Lyell Consols Copper Mines, N. L., capitalization £250,000, shares 10s. par; issued, 350,000 shares.

Lands, 150 acres, leasehold, including the Wallaroo Central mine, 70 acres, adjacent to the Wallaroo mine. The Mount Lyell Consols mine, in Tasmania has been abandoned and the machinery plant formerly in service there has been disposed of.

The Wallaroo Central property shows schists and slates carrying numerous parallel veins including the famous Wallaroo Blue lode. Development is by a 260' shaft, showing 2 lodes of 18' and 7' average width, carrying ore with about 6% copper and \$8 gold per ton.

Equipment includes a 250-h. p. steam plant with hoist, air compressor, and there are necessary mine buildings.

Property considered promising, but company is without sufficient working capital and another reconstruction is probable.

MOUNT LYELL MINING & RAILWAY CO., LTD.

TASMANIA

Office: 39 Queen St., Melbourne, Aus. British office: Palmerston House, Old Broad St., London, E. C., Eng. Operating and works office: Queenstown, Tasmania. Mine office: Gormanston, Tasmania. Wm. Jamieson, chairman; Bowes Kelly, Lindsay Tulloch, Colin Templeton and Hon. Geo. Swinburne, M. L. A., directors; London directors, A. Williamson, chairman; Sir John A. Cockburn, K. C. M. G., John Ball and W. Douglas Reid; D. G. Lumsden, sec.; W. G. Moss, asst. sec.; Edwin Habben, London sec.; Robt. C. Sticht, gen. mgr.; Basil Sawyer, local supt; B. Stafford Bird, Tasmanian agt.; Robt. P. Roberts, chief metallurgist; R. M. Murray, mine supt.; E. Carus Driffeld, railway supt.; G. F. Jakins, asst. engr.; G. W. Wright, mech. engr.; Thos. W. Haynes, business mgr. of chemical works.

Organized Aug. 11, 1903, under laws of Victoria, as a merger of a former company of the same name, with the North Mount Lyell Copper Co., Ltd., capitalization £1,300,000, shares £1 par; issued, £1,300,000. Debentures of the former North Mount Lyell, £140,000, at 5%, were retired 1908, leaving the company without bonded debt. Profit for fiscal year ending Sept. 30, 1910, was £205,000. Balance of liquid assets was £455,500 March 31, 1908, and £405,420 Sept. 30, 1910. Dividends have been as follows: £150,000 in 1904, £195,000 in 1905, £345,000 in 1906; £330,000 in 1907, £210,000 in 1908, £210,000 in 1909, £180,000 in 1910, £75,000 in 1911 and the same amount in 1912. The present company paid dividends, to end of 1912, aggregating £1,770,000, and former company paid dividends of £996,574, giving total dividends, to end of 1912, of £2,766,574. Half-yearly meeting, May; annual meeting, November.

The operations of the company are very extensive, including the mining and smelting of copper ore in Tasmania, the mining of pyrite in Tasmania, with the manufacture of acid and superphosphates in the states of Victoria, South Australia and Western Australia, and the manufacture of coke in New South Wales, the activities of the company thus embracing every state but Queensland in the Australian commonwealth. The methods employed in the various works of the company are of a notably high technical order.

Lands are 2,124 acres, inclusive of 5 consolidated leases, for 21 and 30-year periods, and 565 acres of mill and smelter sites, in the Mt. Lyell district, with mineral lands in other parts of Tasmania where prospecting and mining work is in progress. The Chester mine, in the North Pieman district of Russell county, north of the Pieman river, produces about 1,000 tons of iron pyrites monthly for the various acid works of the company.

The principal mining operations are in the Mt. Lyell district, on the western coast of Tasmania, at a distance of about 14 miles in an air line from the port of Strahan, on Macquarie harbor. The Mt. Lyell pyritic orebody was discovered 1883, and the gossan outcrop, known as the "Iron Blow," was worked for gold in a small way for a short time. Although the pyritic orebody outcropped, its value for copper was not recognized for some years. Actual copper mining was begun 1882, by the predecessor of the present company, and since 1895, the present management with practically the same personnel has been in charge. Other mines opened in the same district did not secure practical results, although the existence and value of the North Mount Lyell mine were recognized in 1897, when development was begun, and continued until the property was merged in the present company, 1903. Owing to the silicious nature of the North Lyell ore, neither concentration nor smelting were successful, and the undertaking was a failure financially after the expenditure of about £800,000. The amalgamation of the 2 mines,

effected 1903, gave a single magnificent property, the pyritic ore of the Mount Lyell and the silicious ore of the North Mount Lyell being natural smelting complements. The Mt. Lyell mine proper is the lowest grade copper mine in the world now worked successfully, and that it is successful is due to the desirability of its ore for fluxing the richer ore of the North Lyell, and the great technical skill with which the property has been developed and is operated, reinforced by the financial courage and sanity of the general management.

Country rocks of the Mt. Lyell mine are hydro-mica schist, conglomerate, quartzite and sandstone, with mineralization occurring along a schist conglomerate contact that is a crush zone formed by an overthrust fault. The orebody is a huge lenticular mass, measuring 270' wide by 660' long, on the 4th level, with an ascertained depth of 685'. This lens originally contained 6,500,000 long tons of ore, about two-thirds of which has been extracted. The ore from the upper workings carried up to 4% copper, 4 oz. silver and 0.16 oz. gold per long ton, but average ore at present carries only 0.53% copper, 2 oz. silver and 0.03 oz. gold per ton. The ore is a very clean slightly cuperiferous pyrite, carrying only about 3.75% silica, 2.6% alumina and 1.8% barium sulphate, with a little zinc and a trace of lead.

The copper occurs as chalcopyrite and tetrahedrite, disseminated through the pyrite. One end of the orebody carried an enrichment, persisting from surface to the bottom of the lens, consisting of a mixture of chalcopyrite and bornite, with a little chalcocite, and in 1894 this part of the mine yielded 850 tons of this ore, enriched by stromeyerite up to a tenor of 21% copper, 1,010 oz. silver and 0.1 oz. gold per long ton, this bonanza deposit netting the old company £105,000 in London, which sum, together with the report on the property from Dr. Edw. Dyer Peters, afforded the necessary stimulus to finance the original company.

The Mt. Lyell mine, lying on a hillside, has been developed, since 1892, by a system of tunnels, crosscuts and contour drifts encircling the orebody, in 8 levels, but the 5 upper levels have been obliterated by a monstrous quarry, from which the ore is extracted in a series of benches with simultaneous removal of overlying or underlying country rock. The ultimate bottom of the quarry is No. 5 level, at depth of 450' from surface; below this level only underground extraction is feasible. A vertical blind shaft connects the 5th level with the 3 levels below, and all are accessible from surface by an incline hoisting shaft, which also serves the quarry. Underground developments, beneath the pit, were begun actively early 1909, giving a productive capacity of 800 to 1,000 long tons of ore daily, from opencast and underground workings combined. In the underground workings ore is stoped in large sections and depleted stopes filled with waste rock from the capping previously removed. The pit has a traveling crane and is electric lighted. The removal of the schist and conglomerate overburden is nearing completion and the finished work will give about 2,000,000 cu. yds. of capping removed, to render available 1,070,000 cu. yds. of ore. A little cement copper is secured from the mine water. It was estimated, Sept. 30, 1912, that the Mt. Lyell proper had ore reserves of 327,209 long tons available for opencast extraction, and 2,033,973 tons available for underground mining, this ore having an estimated average assay of 0.532% copper, 1.96 oz. silver and 0.027 oz. gold per ton. For the half year ending Sept. 30, 1912, the Mt. Lyell mine shipped 96,936 long tons of ore, averaging 0.51% copper, 1.86 oz. silver and 0.040 oz. gold per ton. The mine output is about 700 tons of pyrite ore daily, mostly from the 3 underground levels, the 3 lower benches of the opencut supplying a minor amount.

The South Mt. Lyell orebody is a lens of the same character as the big

orebody of the Mt. Lyell, though much smaller, and not outcropping at surface, being opened from the Mt. Lyell mine and practically a part of that mine. Development 1913 was mainly on the 800' level, the bottom level of the Mt. Lyell mine. South Lyell is about ready for regular production.

The incline shaft at the Mt. Lyell, which raises all ore from the mine, has a 200-h. p. electric hoist, taking current from the reduction works power plant by a 1½-mile special line. Hoisting is in self-dumping skips. At this mine there are 2 Australian-built Corliss cross-compound air compressors, with capacity to reduce 3,100 cu. ft. of free air per minute to 90 lbs. pressure per square inch, and the air supply is diverted, when required, to the North Mt. Lyell mine by means of a 6,000' pipeline.

The North Mt. Lyell mine carries ore as disseminations in highly quartzose schist, in the vicinity of a conglomerate contact, the schistose ore shoots occurring as pipes, or columns, of irregular cross-section, in the recesses of the highly contorted contact surface of the conglomerate. Copper values are mainly in bornite, but there are limited quantities of chalcopyrite and chalcocite, associated with small amounts of pyrite, and there are no deleterious elements. The North Lyell ore averages, as broken, about 6% copper and 1.8 oz. silver per long ton, with a trace of gold, the gangue averaging about 66% silica, 7% iron and 7.5 to 11% alumina. The North Mt. Lyell has a number of closely associated but distinct orebodies, the 2 largest being the Main and New Development orebodies. The Main orebody outcropped at surface, and has a vertical dip with depth proven to 1,000'. The New Development orebody connects with the Main orebody on the 400' level, descending at a very sharp pitch, and carries disseminated bornite of good average grade on the 1,100' level, which is the deepest working of the mine. The character of the ore remains unchanged down to the lowest level opened, except that perhaps chalcocite is increasing with depth.

Development consists of tunnels of 850' and 1,080', and 2 shafts, the Main of 1,180', and the Auxiliary of 800', latter a blind shaft from the 300' level. The lower levels are opened at 150' intervals. Stoping is in progress on all levels from the 400 to 1,100', inclusive, and is heaviest on the 850' level, where the New Development and various subsidiary orebodies show a striking enlargement in area. Filling for depleted stopes is brought from surface by means of 2 main mullock passes, and run to place through branch passes. For 6 months ending Sept. 30, 1912, the North Lyell produced 58,768 tons of ore, with average assay of 5.45% copper, 1.14 oz. silver and 0.0028 oz. gold per ton, and at this date reserves were estimated at 1,083,752 long tons of an average assay value of 6% copper, 1.33 oz. silver and 0.005 oz. gold. The North Lyell has developed wonderfully well and it is evident that the property has excellent prospects of further considerable orebodies, while the ore is persistent to the greatest depth yet reached and high in copper tenor and, although too silicious for straight smelting, blends with the pyritic ore of the Mt. Lyell in an ideal smelter charge. The daily output of the mine averages 400 tons.

The North Lyell working shaft has a 206-h. p. electric hoist, good for 1,500' depth, and the plant includes a 20-drill air compressor, driven by a 350-h. p. motor. The mine water, which is very acid, is forked by 3-throw electric pumps.

The Lyell Tharsis mine, formerly considered worked out, was acquired by the company some years ago and is worked for ore of the same mineralogical character as that of the North Lyell, though very much lower in grade.

The South Tharsis and Royal Tharsis mines are idle. The South Tharsis mine was worked opencast for a time, and the Royal Tharsis has been

developed for underground working by an incline shaft. These properties carry chalcopyrite and pyrite, disseminated sparingly in schist, and the ore, of very low average grade, though not amenable to ordinary wet concentration, will be mined at some future time for flotation concentration.

An important new mining property purchased by the company in 1912, is that formerly belonging to the Mt. Lyell Comstock Mining Co., Ltd. Total area of leases 339 acres. The southernmost sections are contiguous to the North Mt. Lyell leases and contain the northern extensions of the orebodies in the latter, which give them a special value to the company. The deposit worked by the former owners is, however, remote from this locality, being 6 miles, by steam tram, from the reduction works. The mine has been recently reopened by the company and is worked on a steadily increasing scale. The deposit here occurs on the same line of contact of schist and conglomerate as the other properties in the district and the character of the ore is similar to that of the North Mt. Lyell mine, though more basic, while the ore in the southernmost sections is, of course, identical with that of the North Mt. Lyell orebodies themselves.

Near the reduction plant there are extensive silica and limestone quarries, for flux.

The company owns and operates sawmills, at various points, for furnishing mine timber and lumber for general building purposes.

A $1\frac{1}{2}$ -mile aerial tram transports 1,500 tons daily from the Mt. Lyell mine to the smelter. There also is a 4,500' incline surface tram, operating cars in counterbalance, connecting with a three-fourths mile steam railway. The output of the North Mt. Lyell goes by a 1-mile steam tram to the incline tram. Mine timber is hauled from the valley on the mine side by a $1\frac{1}{4}$ -mile aerial tram, gaining an elevation of 1,000'.

The company owns 2 railway lines; a 22-mile line connects the reduction works at Queenstown with the seaport of Strahan, giving rail connections with all parts of the state. This line traverses an exceedingly rough country, $4\frac{1}{2}$ miles having gradients of 1 in 20, and 1 in 16, requiring 4 special Abt-type locomotives, using a center-rack rail, in addition to 3 Baldwin adhesive engines. Equipment includes 135 cars, and the line does a general business, in addition to handling all the company's traffic. The second line connects Gormanston with Kelly Basin, near the head of Macquarie harbor, 25 miles from Strahan. It was built by the North Mount Lyell Co., but since the amalgamation of the 2 companies in 1903 has been operated on a limited scale. The company's private narrow-gauge line has about 7 miles of track, connecting the mines and works.

The 250-ton North Lyell smelter, 11 miles from the mine, has long been dismantled.

The reduction works are at Queenstown, on the Queen river, $1\frac{1}{2}$ to $2\frac{1}{2}$ miles from the mines. No. 1 smelter has been dismantled for some years. No. 2 smelter has six 54x210" blast furnaces, with cast-iron water jackets of solid construction, suitable for pyritic smelting. The capacity is in excess of present requirements, being about 2,000 tons daily. The furnaces have special mechanical feeders and as the smelting column has been lengthened to 18' from tuyeres to edge of downcast, hydraulic lifts also are employed. The 9 No. 8 and 3 No. 7 Connorsville blowers formerly employed were replaced by two 1,025-h. p. Parsons turbo-blowers, of 36,000 cu. ft. capacity each, and one 460-h. p. Parsons turbo-blower, of 18,000 cu. ft. capacity, all driven by steam turbines, giving a 64-oz. blast pressure.

The first successful pyritic smelting ever accomplished was done in this plant, in 1896, under the direction of Mr. Sticht, and the method has been greatly improved since then. Formerly 2 fusions were required, the first

giving a 15% matte, with a concentration of 6 into 1, slags averaging 0.3% copper, the first-fusion matte afterwards being brought up to 40 to 50% copper, without previous calcining. This practice was improved 1903, only a single fusion being required. The pyritic ore from the Mount Lyell, and the silicious ore from the North Mount Lyell, form an ideal smelting charge which has to be supplemented only by a small amount of limestone for fluxing. The charge, averaging 2:25% copper, is brought to a matte of 40 to 50% copper. Slags average about 0.33% copper, 32 to 38% silica, 42 to 52% iron protoxide and about 4% calcium oxide.

The percentage of coke was formerly as low as 1% but is now 3 to 5% in consequence of a reduction of the iron sulphide contents of the ore and an increase of the zinc and lead.

The furnaces have a stationary rectangular forehearth, supplemented by smaller rectangular forehearths, from which the slag flows into a stream of water for granulation. Granulated slag is distributed over the slag dump by three 90-h. p. centrifugal pumps. Matte tapped from the main forehearth is allowed to cool, before conversion, the conversion of matte direct from the blast furnaces being subject to local difficulties that have not yet been overcome.

The 75-ton converter plant has 2 remelting furnaces, with 6 stands, and 14 shells of the Stahlmann type, each 60x96". Converter blast is furnished by two 16x24x309" Riedler steam-driven compound condensing air compressors, each compressing 3,000 cu. ft. of free air per minute. The final product is blister copper averaging 98.83% copper, about 80 oz. silver and 1.5 oz. gold per long ton, the silver contents having declined about 20% and the gold contents about 40% in recent years. For many years, until the end of 1910, the blister copper was sent to Baltimore, for electrolytic refining, but now goes to the Port Kembla works, in New South Wales.

The smelter power plant includes 16 Babcock & Willcox and 3 Stirling water-tube boilers, supplemented by superheaters, surface condensers with air pumps, 2 Green and 1 Lowcock fuel economizer, with induced draught fans, and all subsidiary paraphernalia. The steaming capacity is 110,000 lbs. per hour. There are three 600-h. p. Parsons-Brown-Boveri turbo-generators, and a complete outfit for the distribution of electric current to numerous points, and for many uses, including the power required about the smelter, hoisting and pumping at the mines and electric lighting. A hydro-electric installation at Lake Margaret is now in process of erection and will abolish the use of wood and coal as fuel.

There is a large modern machine shop at the smelter, well supplied with motor-driven machine tools, and a well fitted foundry, having both iron and brass cupolas. There also is a steel foundry, a boiler shop, tinshop, carpenter shop, a brick and pipe plant and minor shops, as the mines and smelters occupy an isolated position, necessitating shops equipped to do heavy emergency work of a constructive nature, as well as repairs.

The water supply for the mines is derived from Mount Owen, a 300,000-gal. reservoir giving high pressure. The water supply of the reduction works, brought by gravity direct to the plant, has been supplemented by the construction of 2 storage reservoirs, with a joint capacity of 80,000,000 gals.

The company maintains coke works at Port Kembla, N. S. W., Aus. This plant, doing a general custom business, in addition to meeting the company's requirements, formerly had 62 ovens, recently rebuilt on more modern lines with 36 funnel-shaped ovens, and has all the accessories of a modern plant, including a combined coal-compressing and coke-pushing machine with a coal washery for cleansing the coal from the Mount Kembla coal mines, before grinding.

In 1905 the company engaged in a somewhat tentative way in the manufacture of acid and superphosphate, building a plant at Yarraville, a suburb of Melbourne, Victoria. This plant, built along American lines, proved very successful and led to the erection of similar acid and fertilizer works at North Birkenhead, near Port Adelaide, South Australia, 1908, and a third similar plant was completed 1910, at Rocky Bay, near Fremantle, Western Australia. The North Fremantle plant is notably well designed and complete, costing about £90,000. The chemical plants have Herreshoff calciners and use the ordinary chamber process for making sulphuric acid. The Yarraville plant has been reconstructed according to the most modern ideas for labor saving, and perfect product, and the other plants are being altered accordingly. Crude phosphate rock is secured from Ocean and Christmas islands. The products of these plants include a variety of superphosphates and commercial fertilizers, demand for which is increasing very rapidly in Australia. The raw material for acid is furnished by the Chester mine, and originally Mount Lyell cupriferous pyrite was used also, for this purpose. At the North Fremantle works, Spanish pyrites are used for the present, though it is hoped that a local supply can be secured later, the high freight rates on Tasmanian pyrite precluding its use for the present. Unfortunately, it is commercially impracticable to utilize the sulphurous acid fumes from the Mount Lyell smelter, because of the very high freight rates encountered, either in carrying the acid away from Mount Lyell, or bringing in the crude phosphate rock.

The company employs about 1,900 men in Tasmania, in addition to considerable forces at the 3 fertilizer plants. About 850 men are employed at the mines, 150 on the railways, and 900 at the reduction works.

Although the average of all ores smelted is only about 2.25% copper, and the pyritic ore now mined from the Mount Lyell mine proper barely exceeds a copper content of one-half of 1%, the cost-sheet makes an excellent showing. Mount Lyell pyritic ore, won opencast, cost about 3s. 6d. per long ton, inclusive of the charge of 2s. for removal of overburden, and cost of ore extracted from underground workings does not exceed 6s. per long ton. Ore mined from the North Mount Lyell costs about 10s. per long ton and constitutes about one-third of the total ore tonnage.

The average cost of mining, smelting and converting, from 1896 to 1903, was \$5.48 per ton, and by this company for 6 years ending 1909, the total mining and smelting cost per ton was \$3.56, a figure that reflects great credit upon an efficient manager and staff. For the fiscal year ending Sept. 30, 1912, costs were \$4.85 per long ton, the increase being due chiefly to the increased cost of production of Mt. Lyell ore, due to the increasing proportion of ore won underground.

Since the organization of the present company 1903, production has been remarkably uniform, the average of ore smelted varying but little from 408,000 long tons yearly, while the production of blister copper has been fairly constant at an average figure of 8,550 long tons. Including the production of the old company, from 1896 to Aug. 11, 1903, the total production by the company, to Sept. 30, 1912, was 5,280,186 long tons of ore, yielding 120,852 long tons fine copper, 10,112,472 oz. silver and 310,292 oz. gold. Of the tonnage smelted, 3,891,683 long tons were supplied by the Mount Lyell mine, 1,075,566 tons by the North Mount Lyell mine, 167,097 tons were purchased ores, and 145,278 tons consisted of metalliferous fluxes. Recent production has been as follows: 20,180,578 lbs. fine copper, 703,945 oz. silver and 23,087 oz. gold in 1906; 17,664,466 lbs. copper, 700,087 oz. silver and 19,449 oz. gold in 1907; 19,357,229 lbs. copper, 681,262 oz. silver and 19,532 oz. gold in 1908; 19,746,719 lbs. copper, 728,707 oz. silver and 13,345 oz. gold in 1909;

18,237,268 lbs copper, 664,575 oz. silver and 13,299 oz. gold in 1910; 17,606,400 lbs. copper, 544,557 oz. silver and 10,375 oz. gold in 1911; 10,317,440 lbs. copper, 315,739 oz. silver and 6,174 oz. gold in 1912.

Output of 1911 was affected by the first serious strike which the company has suffered, hanging up work for the last quarter of that year. In 1912, the output was further diminished by the shortage of labor due to this strike and still more to a disastrous fire which occurred in the North Mt. Lyell mine in October and shut down that property until early in 1913.

The output for 12 weeks, June to Sept., 3, 1913, was 68,270 tons, yielding 2,589,440 lbs. fine copper, 68,270 oz. silver and 2,064 oz. gold.

The Mount Lyell enterprise has had to contend with a series of grave financial, mining and metallurgical problems, all of which have been solved with great skill and signal success. A serious handicap is the heavy rainfall, averaging 110" yearly, hampering a mine worked opencast. Furthermore, two-thirds of the ore averages even lower in copper contents than the leanest of the successful native copper mines of the Lake Superior district, which, for 2 generations, have been treating the lowest grade copper ore in the world, until this unenviable, but highly creditable distinction, passed to the Mount Lyell. The change of policy, inaugurated 1905, by which the company has increased the scope of its operations, through the extensive manufacture of sulphuric acid and commercial fertilizers, is in line with the thoroughly sound British policy of utilizing all payable byproducts. The management is excellent, in all departments, and the success of the company is due neither to good fortune, or chance, but to an effective combination of financial ability with high technical skill.

MOUNT MOLLOY, N. L.

NEW SOUTH WALES

Secretary and head office: J. Gainford, 18 Bridge St., Sydney, N. S. W. Brisbane secretary, C. E. Morton, 373 Queen St.; Adelaide secretary, Bristowe & Co., Brookman's Bldg, Grenfell St.; London secretary, E. Habbn, Palmerston House, Old Broad St., E. C. Mine office: Mt. Molloy, Heberton, No. Queensland. C. Caird, J. North, J. Vicary, W. Tilley and S. Pearl, directors. Organized Sept., 1912, as a reconstruction of the Mt. Molloy, Ltd., capitalization £150,000, shares £1 par.

Property, the Mount Molloy and Mount Cardwell mines, a limestone quarry, midway between Molloy and Bihoohra, and a government concession of 36 square miles, shortly north of the Mount Molloy mine.

The Mount Cardwell mine, at Nymbool, Cardwell county, but slightly developed, carries ore of 1.5 to 2% copper tenor, disseminated in iron ore, constituting a very desirable cupriferous flux.

The Mount Molloy mine, 70 acres, has a wide vein carrying ore shoots of zinciferous chalcopyrite. The mine has 6 shafts, No. 5, the main shaft, being 475' deep, with bottom level, at 470'. The 190' level of the mine proved disappointing, showing a wide vein low in copper contents. The 270' level is the best in the mine, carrying a considerable quantity of ore of excellent average grade, there being a 17' vein carrying a 5' paystreak of high-grade sulphides, with balance of 12' consisting of low-grade cupriferous pyrite. The 370' level shows a decrease in both quantity and quality of ore. The mine was estimated Dec., 1912, to have reserves of about 24,000 long tons of ore of about 3% copper tenor.

Equipment at No. 5, the main shaft, includes a substantial boiler house and engine house, with a first-motion hoist and a 16-drill Thompson air compressor. There is a 20,000-gal. underground tank, holding water for boilers and the water jackets of the blast furnace. The company owns a sawmill at Mareeba.

The smelter has a calcining furnace, reverberatory furnace, and one

36x90" water-jacket blast furnace. Matté is taken from a storage hearth to the converter department, which has 1 stand with 72x84" shells of barrel type, turning out converter bars of 99% average copper tenor. The power plant at the smelter has 3 boilers aggregating 350 h. p. and 7 engines aggregating 300 h. p.

Transportation is furnished by a 20-mile railway line, of 42" gauge, laid with 45-lb. rails, from Bihooora to Mount Molloy.

Production by the old company was 3,093 tons of copper to end of 1908, when smelting was suspended, and new company is giving sole attention to development work.

MOUNT MORGAN EXTENSION CO., LTD.

QUEENSLAND

Secretary's address: J. J. Taylor, Charters Towers, Queensland, Aus. Mine office: Mount Morgan, Raglan Co., Queensland, Aus., Thos. Lester, manager. Organized 1907, as successor of Sugar Loaf Gold Mining Co. Property adjoining the Mount Morgan Gold Mining Co., Ltd., has been explored by extensive diamond-drill borings to considerable depth, property being thought by the management to carry the extension of the copper-gold orebody of the Mount Morgan. Development is by a 651' incline shaft and a new vertical shaft in quartzite, that was 1,620' deep, May, 1913. Equipment includes steam power and a hoist, and the company was developing with a small force at the end of 1913.

MOUNT MORGAN GOLD MINING CO., LTD.

QUEENSLAND

Secretary's address: H. Woodd, 216 Quay St., Rockhampton, Queensland, Aus. Branch offices: 118 Pitt St., Sydney, Aus., and 9 Gracechurch St., London, E. C., Eng. Mine office: Mount Morgan, Raglan Co., Queensland, Aus. R. G. Casey, general chairman; R. S. Archer, chairman local board; Kelso King, chairman Sydney board; W. G. Thompson, H. Perrier, W. K. D'Arcy, W. F. D'Arcy and E. V. Reid, directors; John Jenkin, London sec.; Jas. S. Spark, Sydney sec.; B. Magnus, gen. mgr.; C. H. Humphreys, asst. gen. mgr.; Lewis Westcott, mgr.; A. A. Boyd, mines supt.; N. F. White, chief engr.; J. W. Moule, smelter supt.

Organized Oct. 1, 1886, under laws of Queensland, capitalization £1,000,000, shares £1 par; fully issued, and fully paid. Profits, for fiscal year ending May 31, 1912, were \$257,998. Profits for half-year ending Nov. 30, 1912, were £253,126, and after payment of dividends, surplus was £219,000. Dividends, paid quarterly, have ranged from a minimum of 8d., at the beginning, 1886, to a maximum of £1 2s., in 1889. To end of 1910 the company had paid about 725% in dividends, which were 6s. yearly, 1892-97; 6s. 6d. in 1898; 7s. yearly 1899-1900; 5s. 10d. in 1901; 5s. 9d. in 1902; 3s. yearly 1903-06; 4s. 3d. yearly 1907-08; 4s. yearly 1909-12. Company is second only to the Broken Hill Proprietary among the dividend paying mines of Australia. Accounts are made up to end of fiscal year, May 31, and submitted at Rockhampton in July, and half-yearly statement to Nov. 30, is submitted in December. Company controls, through stock ownership, the Electrolytic Refining & Smelting Co., of Australia, Ltd.

Actual financial conditions for year ending May, 1913, are stated to be: Revenue, £1,140,052; expenditure, £738,923; depreciation, £49,414; net profit, £351,715; dividends, £200,000; surplus, £520,325.

The company holds the Many Peaks mine under a lease irrevocable by the owners, but which may be terminated, on 6 months' notice, by the Mount Morgan, under a royalty of 2s. 6d. per long ton of ore extracted. This property is described under title of its owner, the Many Peaks Copper Mining Co., Ltd.

Lands, 90 acres perpetual leasehold, 80 acres leasehold, and 640 acres freehold. The company exchanged its freehold gold properties for govern-

ment leases, about 1894, and pays a royalty of 1s. per oz. on gold extracted. The property is about 25 miles west of Rockhampton, and the mine has been, since 1890, one of the greatest gold producers of the world.

The company has set out to acquire other properties with the idea of prolonging its corporate existence many years beyond present limits, and is also developing about 7,000,000 tons of low-grade ore in its present property, said to assay 2% copper and about \$4 gold per ton.

The Mount Morgan gold deposit proved to be the silicious gossan of a mammoth copper deposit. The ore showing increased copper values at depth, the company wisely began extensive diamond-drill borings, which proved an immense tonnage of copper ore. The mine, while a single mammoth property, has been operated as 2 connected mines, the upper section being worked opencast. The oxidized ores were exhausted 1910, and only sulphide ores are now mined. The sulphide gold ore is known locally as mundie, being an auriferous and slightly cupriferous pyrite.

Underground development comprises 2 principal shafts, known as the Main shaft, of 1,050' depth, and the Lynda incline shaft, about 1,500' deep. This shaft is 6' 6"x13' 9", being the largest cross-section of any shaft in Australia. Underground ore extraction is mainly from the 650' and 850' levels. An upcast air shaft, for ventilation, in the northwestern end of the mine, connects all levels. Depleted stopes are filled with mullock, on the pigstye system, some of the stopes being of mammoth size, No. 1 chamber, on the 750' level, having a first floor, 60x400' in area. The ore being strongly pyritic, is liable to spontaneous combustion, and a fire, 1909, was walled off by brick bulkheads and dams and extinguished by flooding the affected workings. Miners are taken to and from work on safety man trucks. The mine shows auriferous copper ore reserves, given May, 1913, as 1,365,000 long tons, averaging 3.5% copper and 10 dwts. gold per ton, and 1,982,000 long tons averaging 2½% copper and 5 dwts. gold per ton, with considerably larger quantities carrying 2 to 3% copper and 1 to 2 dwts. gold per ton, all of which should be available for later extraction. The mine's output for year ending May 31, 1913, was 224,385 tons including 203,777 tons of 3.41% copper ore, carrying \$9.50 per ton gold and 9,895 tons gold ore, carrying 2.66% copper and \$18.93 per ton gold.

In 1912-13, 99,022 tons limestone were mined at the Marmor quarry, and the smelter is supplied with iron ore from Iron island, 1 of the Duke group of the Northumberland islands.

Power equipment includes a central plant having four 400-kw. Parsons turbo-generators, 2 hoists, and several air compressors, including a 20-drill Bellis-Morcom 2-stage air compressor with intercooler and cross-compound steam cylinders. The boiler house is equipped with 250-h. p. Babcock & Wilcox multitubular boilers, with chair grate, mechanical stokers and superheaters, the boiler house having a 145' octagonal smokestack of 8' diameter at the top. The boiler house has 1,400-ton coal pockets, and an electric elevator for raising coal to the boiler house bunkers.

Buildings include necessary shops, offices and warehouses, the mine, mills, smelter and power plant occupying a single site. At the portal of the Lynda tunnel there is a 30x100' changing house, having shower baths and 504 lockers. In connection with the power plant there is a firewood storage flat of 5,000 tons capacity, at the west works, with rail connection, and a government railway line connecting Mt. Morgan with the Dawson coal mines.

The district being arid, extensive dams have been built for water storage, there being 7 dams, of which 5, in commission, have an aggregate capacity of 387,000,000 gals., No. 7 having a capacity of 270,000,000 gals.

Gold ore was treated in the mills by chlorination and also furnished about 500 long tons yearly of copper precipitate, of about 60% copper tenor.

The new management is installing 1913, a 500-ton concentrator to cost £50,000, built on the site of the old Mundic works, now dismantled. Experimental work at a small plant proved that fine grinding is necessary and the new mill is based on this work.

The copper smelter, built at a cost of nearly £250,000, and blown in, Jan., 1906, with a third furnace added, early 1908, and a fourth furnace, installed late 1910, giving the works a daily capacity of about 900 long tons, has been patched up to permit pyritic or semi-pyritic smelting, but is to be replaced by an entirely new plant in process of erection 1913, and expected to blow in, March, 1914. The blast furnaces are 48x190" at the tuyeres and the smelter has extensive storage bins for ore, fuel and fluxes. The furnaces have large stationary circular forehearth, replacing the small rectangular movable forehearth formerly used. Matte is made in 2 fusions. Owing to corroded jackets, from bad water, a system of launders and settling tanks for the circulation of water has been installed. Blast for the furnaces is supplied by 4 electrically-driven Connorsville blowers. The blast-furnace building also has a single reverberatory furnace, reducing flue dust to matte of about 20% copper tenor, which is sent to the blast furnaces for a second fusion.

In 1913, the smelter treated a total of 322,098 tons of ore of which 353 tons were purchased; 88,396 came from the Many Peaks mine, 9,677 were miscellaneous products, and 223,672 tons came from the Mt. Morgan mine itself. Converter product is blister copper averaging 98.6% copper and 12.5 to 15 oz. gold per ton, sent to the Port Kembla refinery.

The gold refinery is 78x142' in size, with concrete walls and is equipped with a 12x38' 6" furnace for burning off dross, after which the residue is fluxed and melted in two 5x8' reverberatory furnaces. In the center of the building are 4 pot furnaces, 8' in diameter and 3' deep, for gold bullion. The refinery has an 8x12" Dodge crusher and 14" rolls for handling slags. The strong room for refined gold bullion is built of reinforced concrete, with walls 12' high and 19' 6" thick.

Forces have averaged 2,500 men for many years past, and are to be increased 1914, to about 3,300 men. Ore is broken mainly on contract, this system proving very satisfactory to both employer and employee. The company is very generous in the treatment of its workmen, giving liberally for educational and charitable purposes, and in consequence, has a force of maximum efficiency, with a minimum of friction.

Recent production has been as follows, for fiscal years ending May 31: 257,600 lbs. fine copper and 122,280 oz. gold in 1905; 5,760,458 lbs. copper and 120,606 oz. gold in 1906; 9,154,880 lbs. copper and 145,138 oz. gold in 1907; 12,456,640 lbs. copper and 153,092 oz. gold in 1908; 12,989,760 lbs. copper and 138,342 oz. gold in 1909; 15,818,880 lbs. copper and 178,867 oz. gold in 1910; 15,619,520 lbs. copper and 142,449 oz. gold in 1911; 16,665,600 lbs. copper and 134,575 oz. gold in 1912. For the year May 31, 1913, the company treated 322,098 long tons of ore yielding 9,280 long tons or 20,787,200 lbs. fine copper and 118,488 oz. fine gold. The Mt. Morgan is a fine copper-gold mine, well managed and highly profitable.

MOUNT ORANGE MINING CO.

QUEENSLAND

Office and mine: Mackay, Carlisle Co., Queensland, Aus. Organized about 1908. The mine carries carbonate and sulphide ores, low in silica, and as smelted averages about 15% copper, 6 oz. silver and 0.5 dwts. gold per long ton. The smelter has only a 9-ton reverberatory furnace, making a

first fusion matte of 40 to 50%, and a second fusion matte of 60 to 75%, copper tenor. Idle since 1910.

MOUNT OXIDE MINES, LTD. (N. S. W.).

QUEENSLAND

Office: Sydney, N. S. W. Mine office: Mt. Oxide, via Cloncurry, Queensland, Aus. Sir Albert Gould, K. C. M. G., pres.; J. E. Cocker, sec.; other directors: F. Bacon, G. Allen and T. B. Birbeck; Gerard W. Williams, mgr.; J. D. Henry, supt. Organized July, 1912, under laws of New South Wales, capitalization £200,000, shares £1 par; issued £170,000 Debentures, £30,000 at 6%. Company has sold its holdings to and will exchange its shares for those of a new company of the same name, organized Sept., 1913, in London, which company will have ample funds to place mine on a paying basis.

MOUNT OXIDE MINES, LTD.

QUEENSLAND

Registered in London, Sept., 1913, capitalization £500,000, shares £1 par. Company is to pay off debentures of the Queensland company of the same name, to provide £80,000 capital for mine development, and £400,000, if needed, for construction of a 70-mile railway to Mt. Cuthbert. Company will exchange shares with the old company, share for share.

The flotation is based upon a report by Mr. Gerald Williams, that the mine has 50,000 tons of 24% and 60,000 tons of 10% copper ore developed, valued at nearly \$5,000,000, all above the 300' level.

Lands, 150 acres, leasehold, in the Cloncurry district. Country rock is slate, or graphitic schist, probably of Silurian age. Orebodies occur in shear zones having a dip of about 70°. The ore is mainly chalcocite, with surface showings of atacamite, azurite and malachite.

Development to 300' depth includes 3 shafts of 110 to 308', and a 518' adit tunnel, a total of about 1,000' of workings, mainly on the 152' and 300' levels, where the glance streak averages 4' in width, but expands to a maximum width of 12' in a winze 50' below the adit level. The mine has no power equipment and development work is further hampered by scarcity of labor. The property was reported on by J. H. Fawcett and by G. A. Richard, 1912.

MOUNT ROYAL MINE.

NEW SOUTH WALES

Mine office: Dandaloo, Narramine Co., N. S. W., Aus. Mine about 20 miles west of Dandaloo, in the Orange Plains field, has 2 shafts, No. 1 of 300', with about 500' of workings, showing a considerable body of oxidized ores, and chalcocite assaying up to 40% in copper tenor. Has a smelt r, with 1 small reverberatory furnace, and was making about 30 tons of matte, of about 48% copper tenor, monthly, during spring of 1913.

MT. WARMINSTER LEAD & COPPER MINE, LTD. QUEENSLAND

Office: 166 Bolsover St., Rockhampton, Queensland, Aus. Mine office: Mount Chalmers, Rockhampton Co., Queensland, Aus. H. Eustace King, chairman; Wm. Thompson, sec., at last accounts. Lands, 125 acres, 80 acres freehold, 1 mile N. W. of the Great Fitzroy mine, and 10 miles from Rockhampton. The mine has 2 shallow shafts and a short tunnel, latter showing a 12' vein carrying oxidized and sulphide ores of about 2% copper tenor, from which 23 tons of 20% selected ore was shipped 1907, to the Waratah smelter. The Mt. Warminster mine is idle and company was preparing to turn this property over to leasers at last reports. The company also owns the Britannia gold mine, on the Canoona gold field, said to carry ore averaging 6 dwts. gold per long ton.

MOUNTAIN OF LIGHT MINE.

NORTHERN TERRITORY

Mine address: Leigh Creek, Northern Territory, Australia. Property, 2 miles S. E. of Leigh creek on the Great Northern railway, shows

clay-slates and sandstone with interstratified bands of kaolinized matter, copper-bearing quartz veins and bands of ferruginous quartzite.

Considerable work has been done to shallow depths, and several thousand tons of ore have been taken out. The veins are generally 3 to 4' in width, and carry seams of azurite and malachite, with bunches of tetrahedrite and tenorite, down to a depth of 60'. Diamond drilling was begun May 7, 1912, by the Government, in a line parallel with the strike of the formation, and the first hole was expected to intercept the vein at about 400' from surface.

MOUNTAIN RUN MINE.

NEW SOUTH WALES

Office and mine: Rockley, Bathurst Co., N. S. W., Aus. R. S. Garbutt & Co., owners. Company owns the Mountain Run mine, 12 miles from nearest rail station, discovered 1895, and the Sugar Loaf mine, discovered 1899. The property has 2 veins in schist and slate, the main vein of about 6' average width carrying about 3' of chalcopryite assaying 6 to 12% copper and 1 to 2 oz. silver per long ton, with a trace of gold. The Sugar Loaf mine yields iron ore, used for fluxing.

Equipment includes steam power, with a hoist. The smelter has an 18-ton water-jacket blast furnace, practice of which was so poor that, during a campaign from March to Oct., 1907, smelting 1,400 tons of ore, the yield was only 78 tons of matte of 25 to 50% copper tenor, an absolutely unpayable return. Property developing in 1913, shipping 12 tons of 10% ore in July.

MOURAMBA COPPER MINES, LTD.

NEW SOUTH WALES

Secretary's address: H. A. McMahon, Winchester House, Old Broad St., London, E. C., Eng. Mine office: Hume, Mouramba Co., N. S. W., Aus. A. E. Barton, A. E. Fuerst and C. J. McMahon, directors. Organized Feb. 8, 1910, under laws of Great Britain, capitalization £20,000, increased June, 1910, to £35,000, and again increased April, 1912, to £100,000, shares 10s. par.

Lands, 260 acres, including the Shuttleton and Crowe Creek mines, opened by shafts of 450' and 730' respectively. No recent returns secured.

MOUZAÏA; SOCIÉTÉ ANONYME DE.

ALGERIA

Office: 5 Rue St. Vincent de Paul, Paris, Xe., France. Mine office: Camp des Chenes, par Blida, Alger, Algeria. E. Raschlé, pres.; R. Lava, sec.; M. Duvalard, gen. mgr. Organized Oct. 16, 1890, under laws of France, capitalization f350,000, shares f100 par.

Lands, 5,362 hectares, having 6 fissure veins, in schists, carrying chalcopryite, and 10 contact veins carrying antimonial gray copper. The veins range from 2cm. to 1m. in width and average 4 to 5% copper, and from nothing to 27 oz. silver per ton. Mine is opened by a 17m. shaft and shows chalcopryite ore in 7 tunnels of 39m. to 63m. length, and gray copper ore in 12 other tunnels, longest 265m. Property is but a mile from the West Algerian railroad. The copper properties have been idle since 1899, though the company has opened up large bodies of hematite and spathic iron ore, estimated to contain 4,200,000 metric tons of ore of merchantable grade.

MOZAMBIQUE CO. (COMPANHIA DE

MOÇAMBIQUE).

PORTUGUESE EAST AFRICA

H. D. Hodgkinson, sec., 13 Austin Friars, London, E. C., Eng. Head office: 45 Rue d'Alcirim, Lisbon, Portugal. Austin King, director of mines, Macequede. Incorporated March 8, 1888, given royal charter Feb. 11, 1891, and reconstituted May 5, 1892. Capitalization £1,500,000, shares £1 par; fully issued and paid. Paid a 5% dividend in 1911. Reserve fund £16,257.

Company practically owns and exercises governmental functions over

the whole of the land, mines and produce of 60,000 square miles in the central and richest part of Portuguese East Africa, adjoining Rhodesia. The Manicaland goldfield, or mining district, covers the main mineralized portions of the territory and lies within a radius of 16 miles about Macequece, the district being a part of the Umtala field of Rhodesia. It shows a belt of schists bounded north and south by granite with irregular intrusions of diorite largely altered to serpentine and traversed longitudinally by ledges of ferruginous quartzite paralleling the gold quartz reef. Copper ore occurs and is worked by the South African Copper Trust in the Edmundian and Manica mines. (See descriptions under that title.) Copper also occurs in Mossurise and the Umkondo copper mine is working south of Melsetter, near the frontier.

The company offers prospectors a 12-months' license for £1, with the right to locate (peg off) 10 claims of 100 meters square, which must be registered, and within 12 months thereafter opened by 66' of development work on a group of 10 or less claims, or 6' 7" on each claim, or in lieu thereof pay \$2.40 per claim for an inspection certificate good for 12 months. Claim rents, like those of the Transvaal and Rhodesia start the second year at \$2.40 per claim and increase 50% each succeeding year. Royalties amount to 10% of the net profits, except for gold, for which a graduated scale from 1 to 4% is provided for production less than 800 oz. per month, and 10% for over that amount.

MUNGANA MINING CO., LTD.

QUEENSLAND

Office: 31 Queen St., Melbourne, Aus. British office: Palmerston House, Old Broad St., London, E. C., Eng. Mine office: Mungana, North Queensland, Aus. D. W. Harvey Patterson, chairman; H. F. C. Keats, E. A. Weinberg, V. J. Saddler and John L. Wharton, directors; John Brandon, sec.; Edwin Habben, London sec.; E. J. J. Rodda, mine mgr.; Fred Back, supt. Organized April 1, 1912, under laws of Queensland, as successor of Mungana (Chillagoe) Mining Co., Ltd., capitalization £150,000, shares 6s. par; fully issued and fully paid. Shares are listed on the London, Melbourne, Sydney and Adelaide stock exchanges. Annual meeting, in July.

Lands, 286 acres, held by 6 leases for 50 years from Jan., 1898, at annual rental of £1 per acre, about 10 miles west of Chillagoe, in the Walsh and Tinaroo district. Property includes the Giroffa and Lady Jane mines, showing "cave" or replacement deposits of lead and copper ore mostly oxidized in limestone of Middle Devonian age, alongside of crystalline schists.

The 7 orebodies known occur along an E.-W. direction and are nearly vertical. Two deposits are worked, the largest, the Giroffa, being 70' wide and 200' long, and averaging 1% copper, 12% lead, 7% zinc, and 9 oz. silver per ton.

Development consists of the 730' Giroffa, 460' Saddler, 330' Saddler No. 2, 150' Dorothy, 200' Dorothy No. 2, and 200' Calumet shafts.

The Giroffa mine, worked continuously since 1900, has a good surface showing, with a large orebody in limestone. Development is by a large open-cut, stripped to depth of 50', and a working shaft 730' deep. The mine shows considerable ore assaying up to 8% in copper tenor, but is primarily a silver-lead mine, values in order named being in silver, lead and copper. A new lens of high-grade ore 60x100' was cut on the 710' level in Sept., 1913. Reserves estimated at 70,000 tons blocked out for stoping, or 120,000 tons developed. Timbering is by square sets, and the mine is very wet, giving considerable trouble in sinking, at times.

Equipment includes 500-h. p. steam and 35-h. p. electric plant, 2 hoists good for 1,000', 15-drill air compressor and 16 various buildings.

The Lady Jane mine has met with a series of misfortunes, losing its old

main shaft through drawing, this being replaced by the Saddler shaft, 100' west of the old Lady Jane No. 3 shaft, of 4' 6" x 15' 9" size, inside measurements, with 4 compartments, sunk to depth of 426'. A fire broke out 1909, and continues burning, and the mine is now being flooded up to the 322' point. Production of ore for fiscal year ending June 30, 1912, was only 535 tons.

Minor properties, apparently all idle, are the Griffiths, having an 80' opencut, and the Magazine, having an 83' shaft and an opencut.

Buildings include a general workshop, with other necessary mine structures. There are tanks holding 48-hours' water supply, at each mine, with waterworks for the town, giving fire protection to the buildings. The property is served by the Chillagoe to Mareeba railway. Fuel is cord wood. Ore production is shipped to the Chillagoe smelter, for reduction.

Gross output to end of March, 1913, amounts to 237,885 tons of ore yielding 23,102,977 lbs. fine copper, 2,628,800 oz. silver and 35,144 tons pig lead. Production was 30,275 long tons of ore, yielding 2,719,360 lbs. fine copper, 6,657,360 lbs. lead and 298,505 oz. silver, in 1907; 24,814 long tons of ore, yielding 2,925,440 lbs. copper, 3,178,560 lbs. lead and 306,640 oz. silver, in 1910; 12,847 long tons of ore, yielding 357,932 lbs. copper, 3,812,480 lbs. lead and 91,890 oz. silver in 1912.

MÜNSTERSCHE GEWERKSCHAFT.

GERMANY

Idle. Office: Mozartstr. 16, Düsseldorf, Germany. F. Bonnnütter, gen. mgr.; Fr. Wilh. Lührmann, supt., at last accounts. Property includes the Nassau mine, near Steinbach, and the Stahlberg mine near Rimbach, carrying iron and copper ores, both in a development stage.

MURCIA COPPER & IRON MINES, LTD.

SPAIN

Office: 14 Bedford Row, London, W. C., Eng. Sir G. W. Kekewich, K. C. B., H. Godefroi and H. H. F. Hyndman, directors. Organized Aug. 21, 1912, capitalization £60,000, shares £1 par.

Property comprises sundry copper and iron mines in the vicinity of Blanca, Murcia, Spain.

MUREX MAGNETIC CO., LTD.

ENGLAND

Secretary and offices: G. K. Radcliffe, Baltic House, Leadenhall St., London, E. C., Eng. Hon. L. Holland, chairman; W. C. Bond, managing director; A. Stewart, M. R. A. Samuel, W. J. Loring, directors. Theodore E. Hoover, cons. engr. Organized April 15, 1909, under laws of Great Britain, to acquire British rights to the patents of the Murex Syndicate, Ltd. Capitalization £210,000, shares £1 par, issued 193,493 shares. Company paid £89,993 in fully paid shares and 60,000. 10s. paid to the Murex Syndicate and in 1912 the remaining rights of patent for all other countries were acquired for £90,000.

The value of the process is reported to have been proven successful at the Cordoba copper mines, Spain, Whim Well copper mine in Western Australia, in treating the lead ores of the Grund mine, Harz district, Germany, and at the Malines Co.'s mines in France.

The company is inadequately financed and a reorganization is proposed, the new company to have a nominal capitalization of £70,000, shares 5s. par, exchangeable share for share in the old company (one £1 old share for a new 5s. share), the new company to take over the undertakings and pay off all liabilities.

MURRAY'S REWARD MINE.

TASMANIA

Office: Mt. Balfour, Russell Co., Tasmania. W. Murray, manager. Property shows banded slates dipping 80°, with a good outcrop of leached ore at surface, supposedly succeeded by a zone of secondary enrichment at water level. The lode is a complex network of many quartz stringers

carrying ore shoots, 3 to 9' wide. Ores contain covellite with a little chalcocite, forming veinlets, traversing the lode. The footwall is quartz carrying unreplaced slate fragments and veinlets of chalcopyrite, pyrite and covellite.

Development is by 3 tunnels, none of which give great depth, and a number of shallow shafts, deepest 100'.

Production to June, 1910, was 1,286 tons ore valued at £16,000, and in 1911 amounted to 2,083 tons ore valued at £21,367.

MURTEGA MINERALS CO., LTD.

PORTUGAL

Secretary's address: C. V. Jones, 139 Cannon St., London, E. C., Eng. Letter unclaimed at former mine office, Barrancos, Alemtejo, Portugal. J. Dunham Massey, chairman. Organized Dec. 8, 1900, under laws of Great Britain, capitalization £80,000, shares £1 par. Lands include 7 old copper mines in the district of Beja. Company endeavored to open a mine at the presumable point of intersection of 3 main veins, in the center of a hill, under a promising gossan, by shaft and tunnel. Company comatose and mine inactive for several years past.

MUTOOROO COPPER & SILVER MINING CO., LTD.

SOUTH AUSTRALIA

Office: Hindley St., Adelaide, South Australia. Mine office: Mutooroo, South Australia. J. P. Winch, manager.

Property, 320 acres, leasehold, 14 miles S. W. of Cockburn, showing limestone intruded by igneous rocks, with contact deposits carrying lenticular orebodies of considerable size. The ores carry cuprite, malachite, azurite, chrysocolla and atacamite in the oxidized zone, succeeded at depth by chalcocite, bornite and chalcopyrite, associated with pyrite. Mine is developed to shallow depth only. Average assay of 2,517 long tons of ore extracted, 1896-9, was 6.58% copper. Equipment includes a small precipitation plant. Mine was let on tribute, at last report, to Critchley & Co.

NABABEEP MINE.

CAPE PROVINCE

Owned by Cape Copper Co., Ltd., at O'okiep, Little Namaqualand, Cape Province.

NACKARA PROP. COPPER MG. CO., N. L.

SOUTH AUSTRALIA

Probably closed down. Letters to Nackara, Herbert Co., South Australia, unanswered. To end of 1909 company had received subsidies of £100 from the South Australian government, and had repaid nothing. Lands, formerly known as Robertson's mine, 4 miles from Nackara, have a fissure vein traversing argillaceous and calcareous slates and sandstone of 2 to 4' width, with a 6 to 12" hanging-wall paystreak giving assays of 7 to 25% copper, from a trace to 3 oz. silver and up to 1 dwt. gold per long ton. Mine is developed by 220' main shaft, with 4 shallower shafts, in a distance of 400'.

NALTAGUA; SOCIÉTÉ DES MINES DE CUIVRE DE.

CHILE

Main office: 5 rue de Helder, Paris, France. Mine office: El Monte, Chile. Baron Emmanuel Leonino, M. E., chairman, 7 rue Euler, Paris; Max Lyon, M. E., managing director, 83 Avenue du Bois du Boulogne, Paris; J. de Bethman, A. Boscher, Chas. Chalupt, A. de Dietrich, P. Keller, E. Leonino, A. de Mun, Jorge Matte, A. de Montureux, G. Renevey and B. de Senevas, directors; Maurice Clère, mgr.; Henry Salomon, sec.; Count Bernard de Saint-Seine, smelting engr.; J. Grunberg, smelter supt.; A. Fraysse, C. Lehman, L. Weyl, mg. engr.; Pretot, Fontaine & Co., Valparaiso, purch. agts.; Ledoux & Co., New York, chemist assayer.

Organized Jan. 26, 1907, under laws of France, capitalization f10,000,000, in 100,000 shares, par value f100. Bonds or debentures authorized, f3,000,000, with 5% interest. Total assessment to date, f3,000,000. Net profits in 1909-10, f36,000; in 1910-11, f195,000; in 1911-12, f595,000, giving

total of \$826,000. Has paid no dividends to date. Interest on bonds paid and drawn bonds repaid. Fiscal year ends June 30.

The company owns the properties formerly held by the *Compania Minera de Naltagua*. Holdings comprise 184 *pertenencias* of mineral lands, and the farm *Naltagua*, with a total of nearly 2,000 acres. The country rock is porphyry, with a succession of parallel mantos, or blanket veins, some in limestone and porphyry. These bedded veins have a known length of about 10 kilometers, and are said to average 4% copper. Development work was begun July 1, 1907, and the 6 years' work amounts to about 9 miles. The 7 principal mines are the *Rosario*, *Vacas*, *San Ramon*, *Los Ranchos*, *Carmen Alto*, *Venus* and *California*.

The *San Ramon* mine, thus far the principal producer of the company, has a 3 to 10' vein averaging $7\frac{1}{2}\%$, running north and south, carrying oxidized ores to 65' depth succeeded by *bornite* changing downward into disseminated *chalcopyrite*. The ore carries 1.5 to 4.5% copper as mined and is self fluxing, requiring only a little *pyrite* to give a 50% matte. The mine is developed by tunnels with a back of about 50 meters. The underground workings aggregated 1,200 meters July, 1912. Mining costs at this mine are 18 pesos per metric ton, for ore delivered at the smelter.

The *Vacas* mine, near *San Ramon*, has somewhat similar but leaner ore, though the bed is not so thick and has a calcareous gangue.

The *Ranchos* mines includes the *Gato*, in which a 6' vein of 4% ore in porphyry has been opened for stoping in 1913. The *Carmen Alto* mines have a large amount of ore blocked out in 2 veins which will be mined when a 700-meter tunnel is completed connecting the district with the railway line.

Owing to development being exclusively by tunnel, the mines have no hoists. There are two 3-drill *Ingersoll-Rand* air compressors. The company plans a 2,000-h. p. hydro-electric installation on the *Rio Maipó*. There is abundant wood for fuel on the *Naltagua* ranch.

Transportation include several aerial trams and a private railway line. The *Bleichert* aerial tram, from *El Monte* to *San Antonio*, where the tower station is located, is 5,600 meters in length, with 22 towers, of 22 meters maximum height, on concrete foundations, having greatest span of 386 meters, with fixed rope of 35-mm. and movable rope of 15-mm. diameter. An incline tram, at *San Antonio*, connecting with the lower station of the aerial tram, is 300 meters long, at an incline of 30° , having a double line of rails. A $2\frac{1}{2}$ -kilometer railway connects the incline tram with the private rail system, which has a total length of 14 kilometers, with maximum grade of 5% and gauge of 600-mm. Equipment includes 3 electric locomotives, with 2 and 3-ton ore cars made up into trains of 12 cars.

The 300-ton smelter, $2\frac{1}{2}$ miles from *Naltagua*, in the valley of the *Rio Maipó*, adjacent to the *Rio Mapocho*, is 70 kilometers by river to the coast, and 225 kilometers to *Valparaiso*, with a freight rate of 6 pesos per ton to the latter point. The smelter was blown in, 1909. Equipment includes two $40\times 120''$ blast furnaces. Slags, assaying about 0.4% copper, are granulated, and sluiced to the dump by water.

The converter department has 3 stands, with 9 shells of the *Copper Queen* barrel type, and an electric travelling crane, with a hydraulic accumulator for rotating the shells. Smelting and conversion costs are estimated at 15 pesos per metric ton.

The smelter power plant includes a 375-kw. engine, 2 *Connorsville* blowers and a 100-kw. air compressor for converter blast, furnishing air at 1.2 kgs. per cc. The boiler plant has five 200-h. p. boilers, and a 30-meter steel smokestack.

Forces are about 500 men at the mines and works, with average wages of 5 pesos at the mines and 4 pesos at the smelter.

Production for 1912-13, for 8 months ending Feb. 28, was 2,978,400 lbs., equivalent to 4,450,000 lbs. for the whole year. Past production has been as follows: 293,209 lbs. in 1908-09; 2,253,090 in 1909-10; 2,486,772 in 1910-11, and 4,082,892 lbs. in 1911-12. Above figures are for Chile bars carrying 99.3% copper.

NAMAQUA COPPER CO., LTD.

CAPE PROVINCE

Office: 3 Fenchurch St., London, E. C., Eng. Mine office: Concordia, Little Namaqualand, Cape Province. Sir F. J. Mirrielees, K. C. M. G., chairman; Thos. V. Anthony, Harry von Berg, Col. Frederick J. King, C. L. H. Loeffler and Wm. Rich, directors; A. W. Outram, sec.; S. F. Phillips, gen. mgr. and supt.; J. Garland, mine, supt.; C. H. Feldtmann, mill supt.; Fredk. Butler and J. Paul, elec. and mech. engrs.; L. A. Tait, chemist assayer.

Organized April 23, 1888, under laws of Great Britain, as successor of Namaqua United Copper Co., Ltd., capitalization £200,000, shares £2 par; issued, £188,662. The company has a surplus fund of more than £70,000, invested in British consols, etc., and has returned in dividends more than $3\frac{1}{2}$ times its capitalization. Largest dividends were 40% in 1889 and $37\frac{1}{2}$ % in 1912. Dividends were 30% in 1900; 15% in 1901; 5% in 1902; $13\frac{3}{4}$ % in 1903; 20% in 1904; 20% in 1905; 35% in 1906; $12\frac{1}{2}$ % in 1907; $12\frac{1}{2}$ % in 1910; 25% in 1911, and $37\frac{1}{2}$ % in 1912; total dividends to date, £7 3s. 6d. per £2 share. Profits for 1912 were £81,116, £77,264 available, compared with £59,148 available profits in 1911.

Lands, 750 acres, leasehold, held subject to the Cape Colony mining tax, the principal property being near Concordia, 5 miles N. E. of O'okiep.

The Tweefontein mine, 2 miles N. W. of Concordia, opened 1883, has high-grade chalcopryrite, occurring in intrusive greenstone traversing granite. This mine has 7 shafts, the 2 main shafts being No. 1, of 1,140' depth, with a 12x24" hoist, and No. 2 shaft of 950', which shows, perhaps, the most promising workings in the mine. The Tweefontein was said, by the Cape Colony government, 1909, to have an accumulation of more than 200,000 tons of rejected ore, estimated at 5% copper tenor. Ore reserves of the mine as a whole were estimated, 1912, at 106,500 long tons, containing 6,895 tons of fine copper besides 57,000 tons of slimes and tailings. The Tweefontein ore is screened and selected at smelter.

The Henderson mine, one-half mile from the smelter, is an old mine, flooded for years, but unwatered in 1912, and electrically equipped. On the 94' level, the vein, though narrow, carried a pocket of 7% ore, in which a winze was sunk; the No. 2 level at 180' by connecting with this will open new ore; 390' of work was done in 1912.

The Wheal Julia mine, shortly west of Concordia, has 3 shafts, but development work is suspended and stoping yielded but 105 tons of oxidized ore containing 4.02% copper, in 1912.

The Jubilee mine, formerly known as the Wheal Georgiana, about 1 mile west of Concordia, is said to have been opened by Governor van der Stell, A. D. 1685, and was again reopened by Col. Gordon and Lieut. Paterson, 1779. The Jubilee has 2 shafts.

Miscellaneous properties include the Prospect mine, with 2 shafts, closed down March, 1908; the Flat mine, with 1 shaft; the New East Centre mine, with 1 shaft, and the Hester Maria mine.

Transportation between the various mines and works is over an 8-mile tram line, built 1889, connecting with the Port Nolloth railway of the Cape Copper Co., Ltd., and operated by steam engines.

The main dressing floor is at the Jubilee mine. The smelter has 2 furnaces, burning coke, but considerable concentrated ore has been shipped to Swansea, for reduction. Buildings include necessary shops, a warehouse, office, stores, hospital, schoolhouse, library and dwellings for employes. The buildings are electric lighted.

Production has shown only slight changes during the past decade, having been 5,152,000 lbs. fine copper in 1900; 5,276,712 lbs. in 1905; 5,931,521 lbs. in 1906; 5,447,680 lbs. in 1907; 5,302,080 lbs. in 1909, secured from 46,000 long tons of ore treated; 5,900,160 lbs. in 1910; 5,050,000 lbs. in 1912 from 44,000 tons treated, averaging 7%.

Company plans continuation of diamond drilling in 1913, and improvements in concentration and precipitation plants.

NATIVIDAD; SOCIEDAD MINERA.

PERU

Mine office: Morococha, Junín, Peru. Nicolás Azalia, mgr.; Manuel Quintana, supt. Organized 1895, under laws of Peru and is controlled jointly, through stock ownership, by the Backus & Johnston Co. and the Morococha Co.

Property consists of the Natividad mine, which has been worked for the last 10 years on a very evenly mineralized vein carrying chalcopyrite, tetrahedrite and pyrite averaging 21.65% copper with 530 grams of silver per ton. Mine was drownded for several months in 1912, but is now pumped dry and the lowest level, No. 5, is ready for stoping. Ore is of a very desirable character for the Casapalca smelter and shipments of 1,500 tons per month will be made for the ensuing year. Past production is given in Vol. X.

NAUTANENS KOPPARFÄLT; AKTIEBOLAGET.

SWEDEN

In Nautanen, province of Lapland, Sweden. Company in liquidation, 1912-13.

NAVERSBERG FALUN COPPER MINES & WORKS, LTD.

SWEDEN

Reorganized as the Swedish Metals Extraction Co., and property described under that title.

NAZAROV & CO.

TURKESTAN

Mines and smelter at Naukat, near Kokand, Russian Turkestan. Property consists of 300 acres covering a deposit of native copper at Naukat, 15 miles west of the town of Kokand on the railway. The copper occurs in bedded sandstones, steeply upturned and interbedded with barren red clays and lean sandstone. The copper forms tiny grains, nodules and occasional lumps, but as a whole the bed does not average over 20 lbs. of recoverable copper per ton. The copper measures are traceable along the river Syr-Daria for 12 miles and show 10 distinct mineralized layers varying from 3 to 10' in thickness. The development is as yet but slight, though 1 inclined shaft has reached a depth of 280'. The sandstones are crushed and crumbly as a result of their uplifting so that mining can be done with little powder. The workings follow fault zones since the richer ores are found along the side of such faults.

A 600-ton concentrator has been erected at the mine and is reported to do excellent work. It is equipped with trommels, classifiers, jigs and Wilfley tables. The ore is discharged onto a 3" screen, drops into the trommels, where it is broken up sufficiently to be sent to the classifiers.

The property is idle at present owing to want of capital, since it must be worked on a large scale to be profitable.

NEDRE MIDDAVARRE KOBBERGRUBER

NORWAY

Office: Bodö, Norway. Mine office: Lurfjorden, Kvanangen, Tromsö, Norway. Property is reported, by the Norwegian government, to be working on a small scale, 1912.

NERVA, S. A.; MINAS DE COBRE DE.**SPAIN**

Office: Madrid, Spain. Mine address: Valverde del Camino, Huelva, Spain. Sr. Don Andrés Mellerdo, pres.; Marquess de Portago, vice-pres.; R. Sanchez Ocaño, sec.; J. J. C. Fernan, gen. mgr.; Miguel Higuera y Martínez, engr.; Chas. Hansen, smelter supt. Organized April, 1907, under laws of Spain, capitalization 20,000,000 pesetas, in 250,000 shares of 50 pesetas par, fully paid, and 15,000 shares of 500 pesetas par in deferred stock. Dividend rate is 4% for 3 years on the preferred shares. Company reports 3 dividends of 2 pesetas each for 3 half-years ending Dec. 31, 1907, amounting to 750,000 pesetas.

The company owns the property formerly held by Arenillas Copper Mines, Ltd., liquidated 1904. This includes the Chaparrita group, in the commune of Nerva, and the Ratera or María Concepción group, 3 kilometers from Valverde del Camino, and 8 miles from a railway station. The ores are cupriferous pyrite, said to average 3.5% copper, and occur at the Ratera mine in a narrow orebody, with quartz gangue, carrying lead and arsenic. Mining equipment includes a 250-h. p. steam plant, and mine is served by its own 5-mile branch railway to Buitron.

The works, 2 miles from the mine, covering 843 square meters, and 48' in height, are in 3 sections, 1 for boilers, 1 for machinery, and 1 for the smelter. The 200-ton smelter has two 36x84" water-jacket blast furnaces, with a settler, making matte of about 45% copper tenor. The converter has a 15-ton electric traveling crane and hydraulic accumulator, with 1 stand, turning out blister copper of 98% copper tenor.

The engineers reporting on the property when the company was organized recommended a reduction of the capitalization, and advised the company to give up the Chaparrita and La Fé mines as of little value; to develop the Ratera, Chinblon and Sibelle mines and close down the smelter.

NEU-GLÜCK; GRUBE.**GERMANY**

Mine address: Volperhausen, Rheinprovinz, Prussia, Germany, Ernst Jüngst, general manager. Property carries iron and copper ores, with annual production of about 3,000 metric tons, mainly of iron ore, secured with an average force of 15 men. Mine is opened by tunnel and owners plan to drive a second tunnel of 700 meters length, 45 meters below the present tunnel, to afford direct rail connection.

NEVILL, DRUCE & CO.**WALES**

Office: 4 Corbet Court, Gracechurch St., London, E. C., Eng. Smelter at Llanelly, Caermarthenshire, Wales. Property is the Llanelly copper works, built 1805, which do a custom smelting business.

NEW ALFRED MINES, LTD.**ENGLAND**

Idle. Office and mine: Boligney, Perranporth, Cornwall, Eng. A. J. Swaab and B. Reed, directors; F. Marshall, secretary. Organized March 31, 1909, under laws of Great Britain, capitalization £35,000, shares £1 par, as a reconstruction of Alfred Mines, Ltd. Property is the New Wheal Leisure mine, carrying copper and zinc ores.

NEW ANNIVERSARY MINE.**QUEENSLAND**

Closed down, 1912. Owned by Anniversary Copper Mines, Ltd., at Herberton, Cardwell Co., Queensland, Aus.

NEW CENTRAL SIBERIA, LTD.**SIBERIA**

Office: 155 Dashwood House, London, E. C., Eng. Company has abandoned its copper properties in Siberia and is now a gold-dredging company.

NEW CLARA ST. DORA MG. CO., N. L.**SOUTH AUSTRALIA**

Office: Mundy St., Port Adelaide, South Australia. Mine office: Alberrie Creek, South Australia. F. S. Chany, chairman and sec.; H. Duck, mgr. Organized March, 1898, under laws of South Australia, capitalization

£10,000, shares £1 par; issued £5,345, at last accounts. Is controlled, through stock ownership, by the English & Australian Copper Co., Ltd., and is said to have lost about £1,200 on operations.

Lands, 4 claims, 160 acres, formerly known as the Two Franks mine, 6 miles from a railway, in the Hergott Springs district, held under a 40-year lease. Property shows an orebody carrying malachite and chalcocite, occurring as nodules, in hard limestone, and as veins in soft limestone. Ores include native copper, cuprite and chalcocite, and ore shipped, presumably after careful hand selection, has averaged 26% copper, without gold or silver values.

Equipment includes a 38-h. p. steam plant, with hoist good for 400'. There is a small mill, with a crusher, one set of rolls, and one Mays jig. Company is a very small producer of high-grade copper ore.

NEW CLONCURRY COPPER & SM. CO., LTD. QUEENSLAND

Secretary and offices: B. F. G. Meldrum, 117 St. Vincent St., Glasgow, Scotland. R. L. Alston, chairman, and J. Coubrough, J. P., directors. Organized in Edinburgh, Oct. 29, 1895, as successor of the Cloncurry Copper & Smelting Co. Capitalization £3,300, shares 6s. par; all issued and 5s. paid. Dividend paid 1907, 15s. per share. Accounts for year ending Oct. 30, 1912, showed £768 debit.

Company sold entire holdings in 1906 for £2,000 cash, £20,000 shares in Queensland Exploration Co., Ltd., and £45,000 shares in the North Queensland Railway Co., Ltd.

NEW DISTRICTS DEV. CO., LTD. ARGENTINA & RUSSIA

Secretary and offices: Wm. Smith, 10-11 Austin Friars, London, E. C. Eng. T. H. Hamilton, chairman; E. Turk and L. Ehrlich, directors. E. T. McCarthy, cons. engr. Organized Aug. 15, 1912, as reconstruction of company of same name registered in Transvaal, 1904. Capitalization £200,000, shares 10s. par; 242,000 shares issued, fully paid, to stockholders in former company. Two 10s. shares in the English company were issued for every £1 share in the South African company.

Company owns an interest in the Magato grant, about 740 square miles, in Northern Transvaal and the following copper companies: Spassky Copper Mines, Ltd., Famatina Copper Co., and the Atbasar Fields, Ltd., the latter promising to become one of the largest copper producers of Russia. In addition to these holdings company owns large interests in coal mines, the H. D. Syndicate and other corporations.

NEW EINASLEIGH COPPER MINES, LTD. QUEENSLAND

In liquidation since end of 1911 and properties sold to Chillagoe Co., Ltd., for £10,000 cash, with £25,000 6% second-mortgage bonds and 175,000 shares of 10s. each credited 9s. paid.

NEW LYMNI, LTD.

CYPRUS

Secretary and offices: A. C. Gibbons, 32 Great St. Helens, London, E. C., Eng. Mine office: Lymni, Cyprus. J. G. Gordon, chairman; J. E. H. Lomas and Sir Henry C. J. Bunbury, Bart., directors; J. W. Ashworth, mine mgr. Organized Oct. 28, 1909, as successor of Lymni Copper Mining Syndicate, Ltd., under laws of Great Britain, capitalization £20,000, shares £1 par, in £10,000 "A" shares and £10,000 "B" shares, fully paid. Balance sheet, Oct. 31, 1912, shows purchase price of property, £11,372; development to date, £5,553; engineer's reports, office expenses, etc., £2,439; cash on hand, £615.

Company owns a 42-year copper mining concession dated Sept. 1, 1910, which covers about 30 sq. miles of mineral land in the Bellathousa district of Polis, Paphos, Cyprus. The lands contain lenses of cupriferous pyrite valued for its sulphur as well as its copper contents.

Development includes the 150' Goat and 300' Fasoti shafts and a 2,100' tunnel. This work developed reserves estimated by W. Y. Westervelt, Nov., 1910, at 3,000,000 tons carrying 1% copper and 50% sulphur and 400,000 tons assaying 2% copper. Some of the ore is, however, high grade and if mined separately could be shipped at a profit.

Concentration experiments 1912, by Claude Vautin, show a satisfactory recovery and a Minerals Separation Co. plant is now under consideration.

NEW QUEENSLAND COPPER CO., LTD.

QUEENSLAND

Secretary and offices: J. G. Tait, 6 Princess St., London, E. C., Eng. Mines and works at Mount Perry, via Bunderberg, Queensland, Aus. G. G. Milne, chairman, and J. Noël Sparks, directors. S. H. Pulbrook, gen. mgr.; J. D. A. Smith, cons. engr. Organized Sept. 27, 1910, under laws of Great Britain as a reconstruction of the Queensland Copper Co., Ltd., capitalization £125,000, shares 10s. par; 125,341 issued and fully paid. Government of Queensland made a £4,000 grant in 1912. Accounts to July 31, 1912, showed copper sales, £6,322; product in transit, £5,132; cash, £188 and a loss of £2,905 for the year's operations, increasing debit balance to £11,313.

Property, 1,650 acres, include the Mount Perry copper mines, the Normanby, New Moonta, Reed's Creek and Great Freehold mines, and other properties in the Burnett district, Queensland. The company also owns the Mount Jacobs mine for fluxing ore, and the Daylesford limestone quarry.

The Mount Perry mine has fissure veins traversing granite, the main vein, of 12' average width, carrying a 6 to 8" paystreak in the upper levels, increasing to about 10" width in the lower levels. This ore averages 16% copper, but the balance of the ground is apparently unpayable, with copper below 16 cts. The vein is opened by 3 shafts, the vertical Milne, or main shaft, being 1,220' deep, and developed underground for a distance of 1,400' along its length. The Kennedy shaft, 1,020' deep, with bottom level at 1,000', is the principal producer of the mine.

The Normanby mine, 240 acres, freehold, bought Feb., 1907, for £12,000, is on the opposite side of the mountain from the Mount Perry, but shows a parallel vein, with ore of a similar nature, averaging 13% copper and 10 to 15 dwts. gold per ton. The 497' main shaft, at the southern end of the property, develops a vein of about 12" width, carrying ore estimated to average 12% copper, 6 oz. silver and 10 dwts. gold per long ton, the 2nd level being opened at 350' with a winze to depth of 450'. There is an ore-dressing plant at the Normanby.

Extensive development was commenced in 1912 in 3 of the mines, the following work being now completed: Straightening the Palmer shaft; sinking the Native Copper shaft an additional 150', the Milne's shaft 120', and connecting the Palmer's and Native Copper shafts on No. 5 level, besides other levels with raises and winzes for ventilation. This development has opened up ore in all the levels. The lode in the bottom of Milne's shaft (1,220') shows no diminution in size or value from the levels above. The bottom levels of both the Palmer's and Native Copper mines are reported to open up shoots of high-grade ore. The output of ore from these mines is increasing each month, and with the development work now being carried on a good tonnage should be obtained for some time to come.

The Reed's Creek mine also has a fissure vein in granite, extensively developed. The New Moonta mine, at Boolboonda, 12 miles N. E. of Mount Perry, is a comparatively new property, having a 450' shaft, which yielded about 2,000 long tons of high-grade ore, 1905. The Great Freehold mine, 811 acres, has a nearly vertical fissure vein, in granite, averaging 5' width, with an 18" paystreak carrying chalcopyrite averaging about 14% copper,

with fair gold and silver values, developed by a 200' main shaft. These mines have been idle several years.

A 50-ton concentrator, at Mount Perry, was put into commission, 1910. The company thus far has been mining only high-grade ores, but it is obvious that future production must be maintained by utilizing the leaner ores, of milling grade, of which considerable quantities have been developed.

The smelter, at Mount Perry, built 1902, is connected with the principal mines at Mount Perry by a train line. This plant does custom smelting and the company has ore buyers at Herberton and Ravenswood. The smelter has 40-ton and 90-ton water-jacket blast furnaces and a reverberatory furnace. There is a 120' smokestack. Smelting operations, suspended during the earlier part of 1912, when production was subordinated to development, were resumed in June and have continued uninterruptedly, treating 4,120 tons of ore returning 421 tons of copper, 19,566 oz. of silver and 260 oz. of gold. The company employs 226 men at the mines and 34 men at their smelting works.

In 1911, running for 6 months, the smelter treated 3,208 tons, containing 1,112,160 lbs. copper, 19,911 oz. silver, and 795.7 oz. gold. The mines have proven disappointing, because the promoters entertained hopes based upon a misunderstanding of the facts, and it is evident that the future of the property must depend largely upon the ability of the company to treat lower grade concentrating ores at a profit. Notwithstanding the results secured so far, the property is considered promising.

NEW RHODESIA DISTRICT DEV. CO., LTD.

RHODESIA

Secretary and offices: A. W. Bird, 2 London Wall Bldgs., London, E. C., Eng. H. L. Stokes, chairman; H. W. Fox and P. B. S. Wrey, directors. Mashonaland Agency, Ltd., managers in Rhodesia. Organized Aug., 1900, capitalization £300,000, shares 299,700, £1 par, and 6,000 founders shares, 1 s. par; 150,000 ordinary and all the founders shares issued, fully paid. Accounts for year 1911 show total expense account to date, £81,497; investments, £75,756, now worth £160,369.

Company was formed to develop mining claims in Rhodesia, S. A., and is a general holding company, owning at present 2,500 Bwana M'Kubwa shares and 12,500 Rhodesia Copper & General Exploration shares, as well as interests in various other companies.

NEW RHODESIA MINES, LTD.

RHODESIA

Secretary and offices: A. J. Hall, Dashwood House, London, E. C., Eng. African agents and offices: Goldfields Rhodesian Development Co., Ltd., Bulawayo, Rhodesia. Marquess of Winchester, chairman; J. Eustace, G. Lewis and A. Zenner, directors. Organized June 3, 1909, capitalization £120,000, shares 2s. 6d. par; issued and fully paid, 948,706. Accounts to May 31, 1912, showed operating loss of £7,752; cash on hand, £7,518; investments, £62,498. Owns shares in the Bwana M'Kubwa Copper Co. and in various African gold and coal properties, also in Porcupine and Alaska mines.

NEW SOUTH WALES MINES & SM. CO.

NEW SOUTH WALES

Address: Breadalbane, N. S. W., Aus. Operating on 170' level in 1912, the vein showing 6' of 8.3% ore, according to reports. Has a smelting plant and plans installation of automatic sampling mill, 1913.

NEW STRATAN COPPERS, LTD.

TRANSVAAL

Office: 4 Trust Bldgs., Fox St., Johannesburg, Transvaal. G. Sonn, chairman; J. M. Calderwood, cons. engr. Organized under laws of Transvaal, capitalization £11,000, shares £1 par, fully issued. Lands include 96 claims on the Limpopo river, also 360 base metal claims on government Farm Stratan No. 1386, in the Zoutpansberg district, latter slightly pros-

pected, showing veins giving average assays of 17.72% copper, with traces of silver and gold.

NEW WEST MUTOOROO COPPER MG. CO. SOUTH AUSTRALIA

Company liquidated. The Mutooroo mine was dismantled by the Government early in 1912, but was unwatered and worked for the sulphur content of its pyritic ore by the De Bavay Co. of Broken Hill, in May, 1912.

B. NEWGASS & CO., LTD.

SPAIN

Idle many years. Office: 75 Lombard, London, E. C., Eng. Mine near Changoa, Navarra, Spain. Lands include the Arrieta mine, at Arrieta, and the Changoa mine, at Changoa, carrying silver-lead and copper ores.

NICHOLSON & SONS, LTD., JOHN.

ENGLAND

Office: Leeds, Eng. Mine office: Hunslet, Yorkshire, Eng. Property includes copper reduction works using the wet process for extracting values from cupriferous cinders remaining from the burning of iron pyrites for making sulphuric acid. The company also manufactures acids and ammonia.

NIJNI-TAGILSK (DEMIDOFF) MINES & WORKS.

RUSSIA

Office: Italianski 3, St. Petersburg, Russia. Mine and works office: Bogoslovsk, Nijni-Tagilsk, Perm, Russia. P. T. Zamiatnin, mgr.; L. Tchelischeft, mgr. of smelter. Is owned by estate of P. P. Demidoff, Prince San Donato. Property includes the Miednorudiansk, or Rudianski mine and various other properties, besides the Vijski, or Wiysk smelting works.

The house of Demidoff was granted, by Peter the Great, 2,150 sq. miles of land, on the eastern slope of the Urals. This property includes various copper mines and smelters, 11 iron mines and furnaces, the largest platinum mine in the world and gold placers that employ about 25,000 men during the summer months.

The Miednorudiansk copper mine is at Bogoslovsk, on the outskirts of Nijni-Tagilsk in the Ural region. The mine was discovered in 1720 and has been worked since 1813, being one of the largest copper producers of all Russia in the middle of the nineteenth century. Country rocks are beds of the Permian series with bunches and large pockets of rich ore, in Permian red beds, and as contact deposits in limestone near diorite. The mine carries a great variety of copper minerals, including oxides, carbonates, silicates, phosphates, sulphides and occasional native copper, but is especially notable for its production of massive malachite, a single mass weighing 330 tons having been found in 1836. Ores average 2½ to 3.5% copper without appreciable gold or silver values. The northern part of the mine has chalcopryrite, associated with magnetite, the central part of the mine carries oxidized copper ores, with gangue of hematite and red clay, and the southern part carries small nodules of oxidized copper ores, and occasional sulphides, with talcose gangue. As would be inferred from this varying character, the ores occur in deposits of different nature, the sulphides being in contact deposits, the oxidized ores as replacement deposits.

Equipment includes 8 steam engines, aggregating 520-h. p. Ore is taken to the smelter over 1½ miles of standard-gauge railway, in side-dumping cars.

The Vijski (Wiysk) works do smelting partly in water-jacket blast furnaces, partly in 6 brick shaft furnaces, of a type in use since the eighteenth century, and partly in 2 patented reverberatory furnaces. The works have coal and coke pockets, and flux is mainly limestone, used very sparingly, with all charging done by barrow and shovel. The ore carries up to 10% moisture. Coal comes from the Luneffski mine, belonging to the Demidoff estate, about 100 miles N. E. of Nijni-Tagilsk, by rail, but this cokes poorly and coke from Donetz, in southern Russia, costing \$11.50 per metric ton, is used.

Pyritic ores are roasted, both in heaps and in rectangular shaft kilns, with waste wood, 1 cord being required for 10 tons of ore, but owing to ore being roasted in large lumps, there is comparatively slight reduction in sulphur contents.

There are 6 shaft furnaces, of about 20 tons daily capacity each, built of red brick, with bottom made of a mixture of ground quartz and fire clay, tamped into place and enclosed by a sheet-iron cylinder, each furnace being 48x96" in diameter at the tuyeres, and 5' 6" at the top of the boshes, 4' above the tuyeres, and 5' 10" at the charging floor, with height of 7' 4" from tuyeres to the feed floor. Each furnace has 12 tuyeres, and a movable hood connecting through a sliding joint with a stack, there being no dust chamber. Each shaft-furnace has a forehearth, or settling basin 2' in diameter and 2' deep, in front of the slag tap, connected by launder with a secondary basin, about 3' distant, slag flowing continuously from the second basin into wrought-iron slag pots of the type used 20 years ago. Notwithstanding this primitive method of handling slags, the cost is only 5½ cts. per ton. Matte is tapped once in 24 hours, production averaging about 1 ton, and the slag-brick blocks at the slag tap must be replaced after nearly every tapping. The shaft furnaces are charged every 2½ hours, and require cleaning every second day, this necessitating 4 hours of idleness, and producing much material for remelting. Shaft furnaces last 3 to 10 months, and each requires a crew of 6 men per 8-hour shift, a premium being given for excess tonnage smelted.

The reverberatory furnace is 16' 6" x 27' 3", with 12x3' 6" fire-grates, ore being charged at each end of the hearth, and matte tapped from the middle. The essential feature of the furnace is the use of downdraft fire-boxes, with direction of the flame reversed every 2 hours. The reverberatory is fired with wood, requiring 1 cord of wood for 2.92 tons of ore, the wood being best quality pine, with a little birch, fully seasoned.

First fusion matte carries 32 to 35% copper and is heap-roasted 11 successive times, beginning with 20-ton, and ending with 100-ton heaps. The process of roasting takes 90 days, and losses are entailed through leaching by rains.

The roasted matte, having a sulphur tenor of 5 to 6%, is smelted in small brick shaft furnaces, yielding black copper, white metal and slag. The black copper, of 95.38% average copper tenor, is refined in 8' 3" x 9' 6" gas-fired regenerative furnaces, with blast furnished by 5 Root blowers and a vertical 6-cylinder fan, air being sent through galvanized iron tuyeres, equipped with 2 cast-iron nozzles, that are inserted through the ladle door. The power is furnished by 4 steam engines and 1 turbine.

The smelter employed 450 men in 1912, working 3 shifts. Production was 4,917,896 lbs. fine copper in 1902; falling, owing to the flooding of the mine, to 2,962,250 lbs. in 1905; 6,383,357 lbs. in 1907; 3,890,959 lbs. in 1908, and for first 6 months of 1910, was 69,593 lbs. fine copper, or at the rate of about 4,750,000 lbs. for the year.

Production for the past 10 years has averaged 90,285 tons annually, yielding 4,247,000 lbs. fine copper. The total production for the past 99 years, ending in 1912, is 4,940,395 tons, yielding 285,300,600 lbs. copper.

NIKKO COPPER WORKS.

JAPAN

See Furukawa Mining Co.

NIKOLAJAV WORKS.

RUSSIA

Office and works: Nijni Novgorod, Russia. Property is a copper reduction plant, with an electrolytic refinery of 70 tanks, having multiple arrangement of electrodes, with a daily capacity of 1 metric ton of electrolytic copper.

NILPENA COPPER MINING CO., LTD.

SOUTH AUSTRALIA

Mine near Blinman, Taunton Co., South Australia. Company had a subsidy of £290 5s. 3d. from the South Australian government. Lands, near Parachilna gap, about 10 miles from Blinman, show 4 veins of 4 to 10' width, carrying pockets of low-grade malachite, with quartz, calcite and iron gangue. Mine is developed by 2 short tunnels, 1 of 200' being connected with a 130' shaft. No recent returns secured.

N'KANDHLA SYNDICATE, LTD.

NATAL

Idle. 1 Great Winchester St., London, E. C., Eng. Mine near Ungoya, Zululand, Natal. A. Lee, secretary. Organized March 13, 1902, under laws of Great Britain, capitalization £2,000, shares £1 par; issued £1,800. Property was prospecting rights over 4 blocks, each 600 yds. square, on the Umhlatuzi river, N'Kandhla district, Zululand.

NOLANGENI NICKEL & COPPER SYNDICATE, LTD.

CAPE PROVINCE

Idle. Mine office: Mount Ayliff, East Griqualand, Cape Province. Alfred E. Gibson, E. S. Campbell, J. Taylor and Maj. A. Webster, directors; J. P. Johnson, engr. Capitalization £10,000, vendors taking £200 cash and £7,800 in shares. Owns 2 acres, showing surface ores assaying up to 0.97% copper and 2.08% nickel. A short tunnel shows chalcopryrite disseminated in pyrite, assaying 7.6% copper and 4.89% nickel. The property is also said to carry platinum. Was developing, with a small force, at last accounts, 1910. No recent returns secured.

NONOGASTA; SOC. FRANCESCA DE MINAS y FUNDICIÓN DE.

ARGENTINA

Idle. Mine and works office: Nonogasta, Rioja, Argentina. Lands include the Andueza, Atacama, Muerto and San Toribio copper mines, also various silver mines, in the Tigre district. Ores of the Andueza are claimed to average 5 to 20% copper, 3 oz. silver and 2 oz. gold per ton, but veins are very narrow. Equipment includes steam power and a small smelter, built 1887, to treat dry silver ores, but altered to smelt copper.

NORDDEUTSCHE RAFFINERIE.

GERMANY

Office and works: Hamburg, Germany. Property is an electrolytic plant, having 600 tanks, with multiple arrangement of electrodes, yearly capacity being about 3,000 metric tons of cathodes.

NORDISKA GRUFAKTIEBOLAGET.

NORWAY

Main office: Östersund, Sweden. Mine in the Rjöpparfjord mining district of Norway. J. P. Hård, pres.; Erik Johansson, vice-pres., at Östersund, Sweden. J. P. Kirkhus, supt.; W. Carlgren, mg. engr., of Falun, Sweden. Organized Jan. 9, 1902, capitalization 818,400 kroner, shares 300 kr. par, fully paid, nonassessable; issued, 1,850 ordinary and 870 preferred.

Property comprises 112 claims with 6 orebodies now being developed. Ores reported to carry 1¼% copper and management estimates 2,000,000 tons in sight. Examined 1913, by Otto Stallmann, of London, for an English syndicate.

NORSK-AMERIKANISK KOBBERMINE & SMELTER; AKTIESELSKABET.

NORWAY

Is Norsk incorporation of Norwegian-American Copper Mine & Smelter Co.

NORSKE AKTIESELSKAP für ELEKTROKEMISK INDUSTRI.

NORWAY

Address: Grong commune, Gjersviken, Nordre Trondhjem; Amt, Norway. Samuel Eyde, chairman. Claims comprise four farms, including the Grong copper mines, at Gjersviken, near the Swedish frontier, accessible by road from Finnvolde, showing extensive and promising outcrops of pyritic

copper ores in schist. Property diamond drilled in 1911-12 and explored by 125' tunnel showing low-grade disseminated ore in schist.

NORTH AUSTRALIAN EXPLORATION, LTD. QUEENSLAND

Company holds options on the Mt. Lindsay and Mt. Lidster mines in the Springs district, Queensland, Aus., and on the Camoranian and Eagle leases, 9 miles from the Duchess mine. Shipments from the first-named mines in 1912 showed good copper values.

NORTH BALFOUR COPPER MINES, LTD. TASMANIA

Idle. Office: 31 Queen St., Melbourne, Aus. Mine office: Mt. Balfour, Russell Co., Tasmania. P. J. Deely, chairman; Prince Cameron, manager, at last accounts. Organized April 7, 1909, under laws of Victoria, capitalization £4,000, shares £5 par. Lands, 110 acres, adjoining the Mount Balfour mine on the N., near the Frankland river, on the N. W. coast of Tasmania. Property shows a large copper outcrop, supposed to be the extension of the vein of the Mount Balfour mine. Shut down several years and presumably out of business.

NORTH COBAR LIMITED. NEW SOUTH WALES

Secretary and offices: Claude Bott, 26 Victoria St., London, S. W., Eng., and Equitable Bldg., Sydney, N. S. W., Aus. Mine at Cobar, Robinson Co., N. S. W., Aus. A. Parks Smith, pres.; Col. A. G. Pawle and H. Pearce, directors. J. Leah, gen. mgr.; W. H. Trewenack, cons. engr. Company is a reorganization of the Great Cobar North, Ltd. Organized under laws of Great Britain, Feb., 1913, capitalization £350,000, shares 5s. par. Shareholders in old company received 3 new shares, credited 4s. 3d. paid for each £1 share held. Shares issued, 72,924. Financial statement of May 26, 1913, showed receipts £6,249 with payments of £4,532 for liquidation expenses and Australian current expenses. Cash on hand £1,717; £750 more, making total of £1,750, will be paid for preliminary expenses.

Property includes mineral leases Nos. 11, 12, 13, 20, 21, 31 and 48, total 400 acres, adjoining the Great Cobar immediately at the north. Surface shows silicious gossan. Development by 4 shafts, No. 3 the main working shaft, being 1,609' in March, with levels at 500', 700', 1,300' and 1,500'. A quartz vein and a wide mass of crushed slate and quartz with pyrrhotite, magnetite and chalcopryite, appearing to be the northern continuation of the Great Cobar lode, was cut at 1,450'.

The easternmost vein, outcrop passes through the Great Cobar property, while main lode of the Great Cobar runs as an ill-defined, but wide mass of silicious fragments through the North Cobar property, about 40' W. of No. 3 shaft. Study of the Great Cobar lenses has indicated to the government geologist that the N. lens of the Great Cobar will be cut in the North Cobar at 1,700 to 2,000' in depth. Company's engineer cabled in March that the W. crosscut at 1,500' showed 3' of solid ore. Extensive development in previous years has failed to disclose payable ore in commercial quantities, but present management indicates that future work in No. 3 shaft, together with diamond drilling, is likely to prove successful in discovering lenses of commercial ore. Property considered promising.

NORTH COPPER CO., LTD. SWEDEN

Idle. French office: 55 Avenue Bugeaud, Paris, France. Mines in province of Småland, Sweden. O. Carlander, secretary. Organized July 4, 1906, under laws of Great Britain, capitalization £1,000,000, shares £1 par, in half preferred and half deferred ordinary shares.

Lands are independently reported as 12 four-hectare claims, 48 hectares, and are reported by the management as 50 copper and zinc claims, 400 acres, the Karsebo mines, in the parish of Ramqvilla, the Säfsjö mines in

the parish of Norra Ljunga, and 3 iron deposits at Ingmalala, in the parish of Froderyd, all in the province of Småland, Sweden.

NORTH DUCHESS COPPER CO.

QUEENSLAND

Organized in Sydney 1912, capitalization £20,000, shares 10s. par; 8,000 issued. Owns the North Duchess lease, adjoining the Duchess mine, in Cloncurry, Queensland, Aus. Developed by 110' shaft at last accounts, without meeting with good values. Company will crosscut and drift on 200' level.

NORTH LYELL MINE.

TASMANIA

Owned by Mt. Lyell Mining & Railway Co., Ltd.

NORTH MOUNT BALFOUR COPPER MINES, N. L.

TASMANIA

Office: 31 Queen St., Melbourne, Aus. Mine office: Mount Balfour, Russell Co., Tasmania. P. J. Deely, chairman. Property, 4 sections, 110 acres, covering the N. W. extension of Murray's Reward vein, showing quartz veins 1 to 2' wide in altered slate and carrying graphite and hematite. Ledge consists of brecciated slate, cemented by carbonates and quartz. Developed by long tunnel cutting 5 small veins, the best showing 4' of quartz at 431' from portal and reaching the main lode at 540' where it contains some excellent ore.

NORTH MOUNT BOPPY, LTD.

NEW SOUTH WALES

Secretary and offices: W. F. Garland, 5-6 Queen St. Place, London, E. C, Eng. H. W. Snow, chairman; G. Hardie, Major-General P. D. Henderson, directors. John Taylor & Sons, London, cons. engrs. Organized Dec. 12, 1906, and is second reconstruction of the Royal Oak of Hauraki, Ltd.

Property comprises 90 acres, known as North Mt. Boppy, adjoining the Mt. Boppy mine in the Cobar district, N. S. W. Development work 1910, proving disappointing, operations were suspended. A new gold property known as the Blue Spec mine in the Hargraves gold field, about 27 miles from Muggee, N. S. W., was then purchased for £1,000.

NOR'WEST PROSPECTING CO.

WESTERN AUSTRALIA

Holds option on Breen's copper mine at North Pole, Pilbarra district, W. A. Examined by R. H. Crozier, 1913.

NORTH ZAMBESIA CONCESSIONS, LTD.

RHODESIA

Went into voluntary liquidation Dec., 1912. L. Scotland, Friars House, New Broad St., London, E. C., Eng., liquidator.

NORTHERN COPPER (B. S. A.) CO., LTD.

RHODESIA

Address: T. Donald, secretary, 365 Salisbury House, London, E. C., Eng. Operating office: Bulawayo, Rhodesia. Edmund Davis, chairman; Sir Edward H. Dunning, Dr. F. Rutherford Harris and P. Coventry Tarbutt, directors; Bechuanaland Exploration Co., Ltd., mgrs., in South Africa; Percy Tarbutt & Co., engrs.

Organized Feb. 16, 1895, under laws of Great Britain, as Northern Territories (B. S. A.) Exploring Co., Ltd., changing name June, 1899, to present title; capitalization £250,000, increased 1899, from £100,000, shares £1 par; issued £239,608; fully paid. A former convertible bond issue has been retired. First dividend paid Aug. 20, 1910, was 5% cash and 5% in fully paid shares of the B'wana M'Kubwa Copper Mining Co., Ltd.

This company was formed to acquire prospecting and mining rights in various parts of northern Rhodesia. In 1902 a number of the properties were handed over to a subsidiary, the Rhodesia Copper Co., which, in turn, acting in association with the parent company, floated 3 separate organizations, namely, the Rhodesia Broken Hill, the Kafue Copper, and the Bwana M'Kubwa Copper. The Rhodesia Copper also has a financial interest in the Rhodesia-Katanga Railway & Mineral Co., which is con-

trolled by the Tanganyika Concessions and it owns the Kansanshi copper mine. The report of Northern Copper for the year ended May 31, 1913, shows that 363,000 shares in the above-named companies are held, valued at £116,120. The liquid resources consist of cash and loans against security, £25,868, and debtors, including the Kafue Copper Co., £40,232, a total of £66,000, compared with £78,000 the year previous. The company still owns a number of mineral concessions that are awaiting development, and these are valued at £38,042. Operations for the year 1912-13 show a small loss.

Owing to interchanging of share interests between this corporation and various subsidiary and collateral companies, and the custom of giving reports on mining properties, in which share interests are owned, it is difficult to arrive at the true status of this company, or its exact holdings. The descriptions of the Silver King, North Star, Maurice Gifford, Crystal Jacket, True Blue, Blue Jacket and Sable Antelope mines, formerly given under this title, are given in this volume, under the name of the Kafue Copper Development Co., Ltd., the real owner.

Jan. 1, 1913, property consisted of 3 blocks of 10 sq. miles each, carrying both surface and mineral rights; mineral rights over 10 sq. miles, at Chanobi; 2 tracts of 10 sq. miles each, at the N'Kala and Lunga Sulphur springs; the Lukali farm of 13,500 acres, on the Lukali river; the Algoa farm of 500 acres, between the Lusenswa and Lukashashi rivers; a 10% undivided interest in certain holdings of the Rhodesia Copper Co., Ltd., and 280 mining claims, 377 alluvial claims, and a further right to peg out 205 more claims in northern Rhodesia. Prospecting operations are in progress.

The Chanobi mine, 45 miles from the Silver King, has 5 shafts, on 4 separate outcrops. No. 1 shaft is 100'; No. 2 outcrop has a N. shaft of 92' and a S. shaft of 98', latter showing favorable copper values at bottom; No. 3 outcrop has a 78' shaft showing chalcopyrite and occasional chalcocite; No. 4 outcrop shows copper carbonates on surface. Apparently the various outcrops are of the same small sulphide vein. Improvements at the Chanobi include a warehouse, and a compound for native workmen. Transportation is by traction engines to the railway, at the Kafue river, which will probably run in time to the mines. The company's fortunes are closely linked with those of the M'Kubwa and Copper Mining and Kafue Copper Development companies and it is doing pioneer work in opening up the copper deposits of Central Africa.

NORTHERN MINING & SMELTING CO. NORTHERN TERRITORY

Mine at Leigh's Creek, Northern Territory, Aus. Organized 1903. Company received a subsidy at £350 from the South Australian government. Owns the Mount Rose mine, about 2 miles N. of Mount Rose, and 30 miles from a railway.

The Mount Rose mine, developed by 4 shafts, deepest 203', shows gossan in 2 or 3 short pipes with steep dip. These pipes contain pockets of rich carbonates and gray copper ore up to 35% copper, succeeded in depth by chalcocite and chalcopyrite with pyrite in a gangue of micaceous shale.

To Feb., 1906, the property had produced 370,720 lbs. fine copper. During the last half of 1907, the output was 50 long tons of ore yielding 39,984 lbs. copper. Only prospecting work being done in 1912-13.

NORTHERN TERRITORY OPTIONS, LTD. NO. TERRITORY

Address: Pine Creek, Northern Territory, Australia. Company has option on Coronet Hill mine, 35 miles from Pine creek, the railway terminus. Property includes 320 acres, showing favorable outcrops carry-

ing copper and gold values. Development shows a 40 to 60' lode on which a 100' shaft has exposed 34' of vein matter carrying gold and copper on bottom level, with lead-silver ores above. Field is a new one of apparent merit, which is now being energetically prospected.

NORWEGIAN-AMERICAN COPPER MG. & SM. CO. NORWAY

Office: Chicago, Ill. Operating office: 3 Fjordgaden, Trondhjem, Norway. Mine offices: Levanger, Trondhjem, Norway, and Goulasjok, Lyngenfjord, Tromsø, Norway. Adolph Larson, president. Organized April 20, 1905, under laws of South Dakota, capitalization \$1,000,000, shares \$1 par, non-assessable. Annual meeting, first Monday in April.

Lands, 54 claims, in 5 groups, distributed in 4 districts, formation being much the same, at the various properties. Country rock is micaceous schists, of lower Silurian age, with eruptive greenstone conformable with the schists, orebodies occurring as thin lenses, very persistent in strike and depth, on the contact of the schists with metamorphosed olivine gabbro. Ore is cupriferous pyrite, carrying 3 to 10% copper and 10 to 30% sulphur, with small gold and silver values.

The Fines mine, the principal property, is about 1 mile S. of the head of the Værranfjord, a branch of Trondhjemsfjord, about 60 miles from Trondhjem. All property is owned outright, except the Fines and Tingstad mines, which are held under a contract, by which they can be bought for \$42,500 cash, or the same price in yearly installments, or can be operated for 90 years on a royalty basis. The Fines, an old mine, operated in a small way, many years ago, has an ore channel carrying lenses of 3 to 10' width, with an average of about 6', one lens being proven for about 1,200' in length. Development includes several thousand feet of shafts, tunnels, crosscuts and drifts, and about 10,000 tons of ore have been extracted. The ore carries 0.15 to 5% copper, and about 45% sulphur, and Dr. J. H. L. Vogt, the eminent geologist, of Christiania, estimates that the concentrating ore will average about 1.6% copper.

The 80-ton mill has 1 crusher, 2 Chilean mills, and two 80-ton Elmore vacuum oil flotation units, of which only 1 is installed, the other being on the ground. The company reports an extraction of 85% of the assay values, producing concentrates averaging 11.8% copper from ore averaging 1.6% in copper tenor. The mill has a 100-h. p. Tangye suction gas producer, burning anthracite coal. A 3,000' aerial tram leads to shipping bins upon a wharf at tidewater.

The Tingstad mine is in a valley near the Fines, and is held under the same contract as the Fines, on the basis, alone, of a cash price of \$10,000, or a royalty of 35 cts. per metric ton on production.

The Skardahl mines include the Bratfjeld and Skarfjeld mines, at the head of Kaafjord, a branch of the Lyngenfjord, lands being extensive, extending for 10 miles up both sides of the valley. This property apparently is of more promise than the Fines and Tingstad mines. The Skardahl group shows 3 veins, 1 apparently an extension of the orebody of the Birtavara mine, and 2 parallel veins, about 16' apart, are developed by 3 tunnels, of about 3,000' aggregate length. The upper vein ranges up to 3 meters in width, and the lower up to 2 meters, and there is a possibility that these veins will join at depth. Development work gave about 1,000 tons of ore, of which 200 tons assayed 6.7%, 400 tons assayed 4%, and 600 tons assayed 2.2% copper, an average of 4.3%. Prof. Vogt classes ore of 5% or better as smelting ore, and ore under that tenor as concentrating ore. The Skardahl group has produced 4,500 tons of ore, shipped to smelters, under this company's ownership. This group also includes the Kobber Liens mine, 2 miles up the valley from the Bratfjeld.

Improvements at the Skardahl group include an office, accommodations for 50 workmen, and several other mine buildings. There is a 2,300' aerial tram, and a small river near by has a 300' waterfall, which should give several hundred horsepower. The Lyngenfjord does not freeze over in winter.

Miscellaneous holdings include claims on the Island of Vandö, near Tromsö, and the company also holds mining lands in the Signaldahl, of the Lyngenfjord. The Os or Faadals mine, formerly owned by King Christian Frederick of Denmark, is near the Meraker mines, in the Røros district of Trondhjem. The various properties include water rights to a number of valuable waterfalls.

Radical disagreement between the directors and Mr. Boholm, the Norwegian manager, led to the suspension of work in 1910.

NORWEGIAN COPPER & GENERAL MINING CO., LTD. NORWAY

Secretary and offices: H. J. Anning, 21 Bucklersbury, London, E. C., Eng. S. Miall, E. P. Bainbridge and S. H. Menzies, directors. Organized March, 1912, under laws of Great Britain, capitalization £64,000, shares £1 par; all issued and fully paid. Company took over various options on mining properties in Norway and Sweden from the Evenoes Mining Syndicate, Ltd.

NOVAJA-ZEMLJA MINING CO.

RUSSIA

Company formed in 1912 to investigate copper deposits near Popes bay on Nova Zembla island. An expedition was fitted out at a cost of 200,000 rubles, financed by some Russian banks, with the S. S. Nikolai II and a full corps of assayers, engineers and workmen. Expedition returned Nov., 1912, and the reports being favorable, the property will be opened up on a commercial scale some time in the future. The scientific results will be brought out by the Russian geological survey.

NOVIKOFF & CO.

TURKESTAN

Address: Naukat via Kokand, Russian Turkestan. Succeeds Compagnie Anonyme Nasaroff, a Belgian corporation. Owns the Supetau copper mines and a small ore dressing, concentration and smelting plant on right bank of the Syr Daria river, between the villages Hodja-Yogana and Tchil-Mashram. The Supetau mine shows steeply inclined beds of copper-bearing sandstone, interbedded with limestone. The metallic copper occurs in flakes, grains and nuggets cemented by calcite and gypsum. The ore-beds aggregate 18 to 20' in thickness and are traceable for 12 miles up and down the river.

Property, 2 claims, 83 hectares, developed by several shafts of 10 to 35', deepest being 70'. There are 5 nearly vertical copper-bearing beds varying from 2 to 7' thick and averaging 1.75 to 2.25% copper, excluding coarse nuggets. At the mill, the beds come together and the ore is 20' thick, averaging 2.25% in the open cut and 2.5% copper at 64' depth. The combined 5 beds are 8.4 meters thick and opened for 1,600' horizontally.

NUESTRA SONORA DE LA SALUD; SOC. MIN.

SPAIN

Idle. Mine at Chaparrita, por Rio Tinto, Huelva, Spain. Property, 110 hectares, including 11 old mine workings. A small production of cement copper was secured by leaching waste left from former operations.

NUEVA AUSTRALIA MINE.

PERU

Mine near Pacasmayo, Cajamarca, Peru. Has a lens of low-grade disseminated pyritic ore, of considerable size, opened by tunnel. The smelter has calcining and reverberatory furnaces, burning wood. Product is shipped, as bars, to Cajamarca.

NUEVO PORVENIR SMELTER.

CHILE

Owned by Sociedad Minera San Juan, at Higuera, Coquimbo, Chile.

NYMAGEE COPPER, LTD.

NEW SOUTH WALES

Dissolved Aug. 29, 1911, and was succeeded by the Nymagee Copper Co., Ltd.

NYMAGEE COPPER CO., LTD.

NEW SOUTH WALES

Address: Nymagee, Mouramba, N. S. W., Aus. M. Ansen, mgr.; Mr. Lyon, cons. engr.; Mr. Martin, supt. Company organized 1912, to succeed Nymagee Copper, Ltd. Owns Nymagee mine, one of the oldest and largest copper producers of the state, situated 50 miles S. E. of Cobar. Property produced 341,191 tons of ore, yielding 22,021 long tons of copper up to the year 1908.

Property has a large acreage and shows according to the N. S. W. Geol. Survey, an outcrop of slate and sandstone with inconspicuous copper staining. The lode is 30' wide throughout the mine, and carries lenticular orebodies, the main ore shoot being 15 to 20' thick, 250' long and averaging 10% copper. The Nymagee Copper, Ltd., purchased the property 1906, dismantled the old plant, put in a new equipment 1907, and went broke 1910. The 700' level of the mine, the lowest worked by the old company, showed a lens 15' wide, 200' long, averaging 3% copper. The present company reopened the mine 1912, and proposes to spend £40,000 in developing new orebodies.

The Nymagee smelter, rebuilt 1907, has 3 small water-jacket blast furnaces and 4 small reverberatory furnaces for refining matte to blister copper of about 99.5% copper tenor. Largest production of the Nymagee was 2,388,320 lbs. fine copper, 1886. Production was 1,630,720 lbs. fine copper in 1898, and was 26,649 long tons of ore smelted, averaging 2.5% copper, yielding 1,491,840 lbs. fine copper in 1906. Although the average grade of Nymagee ore is dangerously low, the property is considered of promise, if given the railway transportation facilities absolutely essential to its successful operation.

OBYE MINE.

JAPAN

Sakamoto & Co., owner, Nakanosha, Okayama, Bitchu, Japan. Employs 850 men. K. Ogawa, manager. Is a very old mine having numerous 2 to 4' veins carrying chalcopryite and small quantities of argentiferous galena with quartz gangue, traversing clay-slate and granite. Equipment includes a 1,542-h. p. steam and 110-kw. electric installation. There is a good smelter in connection with the mine. Production was 1,455,488 lbs. copper in 1906, 1,202,878 in 1911 and 759,831 lbs. in 1912.

OCAÑA; CAMILO.

CHILE

Idle. Address: Taltal, Antofagasta, Chile. Owns the Estrella de Venus mine, opened to depth of 125 meters; ore, hand sorted, carries an average of 24.1% copper. Also owns the Ligua and Gyacolda mines with gold and silver-bearing copper ores. Equipment includes steam power and there is a concentrator with 4 Chilean mills.

OGOYA MINE.

JAPAN

Mine office: Nishio-mura, Nomi-gori, Kaga, Japan. Takatoshi Yokohama, owner and general manager.

The mine, the sixth largest producer of Japan, opened 1878, carries chalcopryite, with bornite and pyrite, in numerous quartz veins traversing rhyolite. Three parallel main veins are worked, ranging 1" to 4' in width and 500 to 2,000' in length. The mining plant is modern and there is a hydro-electric power installation. Smelter, formerly of 30 tons daily capacity, has been enlarged. Production was 1,503,967 lbs. fine copper in 1906, 2,476,153 lbs. in 1911 and 3,079,951 lbs. in 1912.

O. K. COPPER CO., N. L.

QUEENSLAND

In liquidation. Sidney Cornish, 23 Brookman's Bldg., Adelaide, S. A.,

liquidator. Mine and works office: Chillagoe, Lynd Co., Queensland, Aus. Organized June 23, 1909, under laws of Queensland, as a reconstruction of the O. K. Copper Mines Development Syndicate, N. L., capitalization £70,000, shares 4s. par; issued 337,450 shares. The old company paid total dividends of £92,798, and had protracted litigation with A. Hirsch & Sohn, of Halberstadt, Germany, resulting in an adverse verdict for £19,570 and costs, compromised by a cash payment of £16,500, and all the money that the company had, necessitating a reconstruction.

Property, 4 mineral leases, 90 acres and a 60-acre smelter site at O. K., near Mungana, North Queensland, includes the O. K. mine. Land shows altered silicious argillaceous and hornblendic shales, carrying irregular lenses of ore, capped by a practically barren gossan. The two orebodies developed range from 12 to 80' in width, and carry oxidized ores to 40' depth, succeeded by about 120' of high-grade chalcocite and passing out of the shaft at 170'.

Exploration by 2,000' of diamond drilling, failed to disclose better than 5% ore, considered by management to be too low in value to be profitably mined.

The main shaft, of 300' depth, has levels at 80', 115', 150' and 200', levels being much too close together. Very little development work was done, 1906-07, during the era of high prices, though after the break, sinking and development was resumed, but too late. The 300' level has developed unsatisfactorily and the rich ores have been pretty thoroughly gutted, but considerable bodies of low-grade smelting ore remain.

The smelter has a calciner and a 36x72" blast furnace, of 70 tons capacity, with a brick dust-chamber and stack. The converter department has 1 stand with 4-ton Leghorn shells.

Production was 13,867 long tons of ore smelted, with an average recovery of 10.8% copper, yielding 2,341,197 lbs. fine copper in 1906; 3,351,197 lbs. fine copper in 1907; 3,404,800 lbs. in 1908, and 1,500,000 lbs. in 1909. The smelter was blown out Oct., 1909, blown in again Jan., 1910, and all work was finally suspended June 9, 1910. In the last month of smelting, April, 1910, the works treated 1,122 long tons of ore yielding 61 tons of blister copper carrying 961 oz. silver and 49 oz. gold, showing a recovery of but a little better than 100 lbs. of copper per ton smelted. The mine is considered valuable, although it lacks transportation facilities.

OKER: VERWALTUNG d.KGL. PREUSS. & HERZOGLICHEN

BRAUNSCHWEIGISCHE KOMMUN HÜTTEN-

STAATSWERKE.

GERMANY

Is smelting plant of Rammelsberg mine, Goslar, Hanover, Germany.

O'OKIEP MINE.

CAPE PROVINCE

See Cape Copper Co., Ltd.

D'OREY; WALDEMAR.

PORTUGAL

Office: 4 Praca dos Remolares, Lisbon, Portugal. Mine at Castro Verde, Alemtejo, Portugal. José P. d'Orey, general manager. Organized 1907, under laws of Portugal, capitalization \$20,000, shares \$100 par, payable at call.

Owens the Algaré mine, with 2 claims, 100 hectares. Property shows schist of lower carboniferous age, with large beds of quartzite carrying several orebodies. 1 under development of 15 meters estimated width, traceable 400 meters, having an iron gossan carrying copper oxides and carbonates. Development by 2 shafts and a tunnel, with about 300 meters of workings, showing about 500 tons of ore, giving assays up to 45% copper.

ORIENTE DE THARSIS MINE.

SPAIN

Office and mine: Alosno, Huelva, Spain. Wm. Guthrie Bowie, man-

ager. Property includes the Oriente de Tharsis mine, 16 hectares, owned by Wm. Guthrie Bowie & Sons and the Mina Hueca, 12 hectares, owned by Sr. D. Eduardo Diaz. The property covers the downward extension of the Hueca pyrite deposit. The land adjoins the holdings of the Tharsis mine on the E., and lies along Kilometers Nos. 2 and 3 of the Tharsis railway, which passes through the tract.

The mines have old Roman shafts, whose deepest workings are 90 meters. The property has an irregular gossan, but the lenticular orebodies of the Hueca mine dip into the Oriente de Tharsis ground. The modern shafts of the Hueca have just reached the pyritic zone. The mine has 3 levels opened, workings amounting to 400 meters, showing several orebodies; 1 of 12 meters width, carrying ore assaying up to 5% copper; 1 of 7 meters width, assaying up to 4% copper, and a third, of 5 meters width, assaying up to 3.5% copper. The second level shows a mammoth orebody of 135 meters width, carrying ore averaging about 1.25% copper. Property considered promising.

ORITO; COMPANIA DE MINAS EL.

CHILE

Office: Valparaiso, Chile. Mine office: El Orito, Vallenar, Atacama, Chile. Organized July 19, 1904, under laws of Chile, as a reorganization of Sociedad Minera el Orito, capitalization £50,000, shares £5 par. Property includes Las Breas mines, opened 1888, which formerly produced about 1,000,000 lbs. fine copper yearly.

The smelter, known as the Fundición El Orito, or Fundición Las Breas, 18 leagues from Vallenar, has 2 reverberatory furnaces turning out matte of about 60% average copper tenor. Fuel is both coal and wood. Production was 847,009 lbs. fine copper in 1907 and 698,564 lbs. in 1908, but the smelter has been idle since 1909.

ORKLA MINE CO. (GRUBE-AKTIEBOLAG).

NORWAY

Office and mine: Lökken Vaerk, Meldalen, Søndre Trondhjem, Norway. Dr. F. Esser, gen. mgr.; F. Brocha, sec. Organized Dec. 7, 1904, under laws of Norway, capitalization 4,140,000 kroner, shares 180 kroner par, increased later to 7,000,000 kroner. The company formerly was controlled by the Orkla Mining Co., Ltd., now dead.

Lands, 232 claims, 2,500 hectares in the Meldal and Orkedal valleys of Søndre Trondhjem. Principal properties are the Lökken, Höidal and Dragset mines, carrying 2 main ore belts, the southern running from the Dragset through the Lökken and Höidal mines to the Aamot mine, in the S. E. a distance of about 9 miles. The northern zone runs from the Holum mine to various ore deposits on the Grefstadfjeld in the E., a distance of about 6 miles. Ore occurs as disseminated chalcopyrite and cupriferous pyrite in veins and lenses, in a brecciated schistose diorite of Silurian age. The ore deposit is estimated by the management to average 2 to 3% copper and 40 to 45% sulphur, with 5,000,000 metric tons of ore in sight.

The Lökken mine, opened A. D. 1657, has a 200' upper shaft and 750' incline shaft, having a double hoist for ore, and a double hoist for men, and there is a 900' tunnel. This mine shows large orebodies. The Höidal group, opened A. D. 1680, includes the Gamla Höidal and Nya Höidal mines, principal openings being tunnels of 200' and 500'. The Dragset mine has shafts of 200' and 300', and a 100' tunnel.

The Aamot and Kong Karl mines have 100' tunnels each, and the Victoria mine, opened 1870, is also slightly developed. The Holum mine, a new property, has 3 parallel orebodies, of 3 to 5' width, traced for distance of about 160'.

The concentrator, at the Lökken mine, has 11 Elmore vacuum oil flotation units, and is rated at 800 tons daily capacity, being the largest copper

concentration mill in Scandinavia. Ore is brought to the mill by an 8.4-kilometer aerial tram from the Dragset mine, and a 2.7-kilometer aerial tram from the Höidal mine. The principal mining machinery is at the Lökken, near the mill, and includes two 20-h. p. Ingersoll-Rand air compressors.

The mine and works use 1,200 h. p. electric energy, brought 30 kilometers from the Skjaenaldfos hydro-electric installation, at 15,000 volts, in a 3-phase alternating current.

The company has its own postoffice and telegraph office, by permission of the Norwegian government.

The Chr. Saldeson & Chr. Tham's Communication Aktieselskab is a subsidiary corporation, organized by this company for power and transportation purposes, which has developed the water power at Skjaenaldfos, and built a 28-kilometer electric railway, equipped with 8 electric locomotives and 60 cars, running from the Lökken mine to Thamshavn, at the mouth of the Orkla river, in the Orkedalsfjord, where the company owns large wharves for goods and passenger traffic and has automatic loading devices for the dispatch of ore. This company also owns a steamer that makes 2 round trips daily, between Thamshaven and Trondhjem.

Production began 1910, when the output was 38,000 metric tons of pyritic lump ore, and 12,000 tons of concentrates, estimated to have yielded 2,000,000 lbs. fine copper. The property is considered decidedly promising and the present company seems capable of carrying out the work planned and becoming a profitable concern.

ORTONA MINE.

QUEENSLAND

John Moffat, owner, Percyville, Queensland, Aus. Property is a new mine on the Percy river, 12 miles from Percyville and 42 miles from the railway at Forsyth, in the Chillagoe district. Mine has developed a deposit of commercial ore and is equipped with a concentrator. A government railway line is planned.

OSORIO i CA; ENRIQUE.

CHILE

Idle. Mine office: Mina Grande, La Serena, Coquimbo, Chile. Property, the Misterio mine, which produced, at last accounts, about 300 metric tons of 22% ore annually from a vein of about 40" average width, opened to 50 meters depth. Also La Purisima mine, which produced about 400 tons of 18% ore, equal to an output of 300,000 lbs. fine copper for both properties.

OTA MINE.

JAPAN

Mine office: Ota, Yamaguchi, Nagato, Japan. Kunizo Ikuta & Co., owners. Equipment includes a 468-h. p. installation and forces averaged 239 persons in 1911. Production was 73,145 lbs. fine copper in 1906; 1,028,869 in 1911, dropping to 52,344 lbs. copper in 1912.

OTAVI EXPLORING SYNDICATE, LTD.

GERMAN S. W. AFRICA

Secretary and offices: C. Launspach, 1 London Wall, London, E. C., Eng. Mine office: Grootfontein, German S. W. A. E. Davis, J. B. Schroeder, H. Strakosch, directors. Organized Dec. 15, 1909, under laws of Great Britain, capitalization £63,000, shares in £60,000 ordinary shares of £1 par and 60,000 deferred shares of 1s. par.

Company is a prospecting syndicate organized for the purpose of exploring and developing the 1,000-sq. mile tract of the Otavi Mines & Railway Co. The lease excludes properties already located, runs until 1919 and calls for a rental of 35% of the net profits of operation. Company mined 354 tons of copper-lead ore in 1913.

OTAVI MINES & RAILWAY CO. (OTAVI MINEN

UND EISENBAHN GESELLSCHAFT). GERMAN S. W. AFRICA

G. Launspach, London secretary, 1 London Wall Bldgs., London E. C., Eng. Main office: 31 Unter den Linden, Berlin, Germany. Mine office:

Tsumeb, Otavi, German S. W. A. Management committee: Gustav Duft, M. von der Porter, J. Kloke. Directors: Dr. P. Dr. Fischer, Dr. P. Schwabach, Komm. Rat M. Steinthal, E. Davis, P. Boettger, E. Zintgraf, F. Urbig, J. Thometzek, mine mgr.; Baurat A. Morgenstern, railway mgr.

Organized April 6, 1900, under laws of Germany, capitalization 4,000,000 marks, originally 1,000,000 marks raised to 20,000,000 in 1903 and reduced to present figure, 1910; shares 20 marks par, in 20 series of 10,000 shares each, fully issued. There are also 200,000 deferred shares of no assigned value. Is controlled, through ownership of about 55% of the stock issue, by South West Africa, Ltd. Annual meeting in December.

This company was formed by the South West Africa Co., Ltd., the Direktion der Disconto Ges., of Berlin and the Exploration Co., Ltd., to deal with the development of mineral and railway rights in the concession owned by the South West Africa Co., Ltd., including a copper-lead property. A railroad 350 miles long, built by the company, connecting the company's property with the seaport of Swakopmund, was finished 1906, and sold 1910, to the German Government for \$5,500,000. Company then leased the line for 10 years, with 20 year further option, at 5% (and for renewal) 15% of purchase price.

The company's plan of finance calls for carrying a 5 to 15% reserve, followed by dividends of 5% on ordinary shares, after which 10% is allowed the board as a bonus, out of surplus, the board taking, however, but 7½%. Balance is divided equally between the ordinary and deferred shares. Profits for fiscal years ending March 31 were 350,145 marks, practically all from the railway, in 1907; 4,339,057 marks, of which 2,443,620 marks came from the railway, and 1,824,696 from mining operations, in 1909; 3,629,364 marks in 1910, with net profits of 1,687,168 marks from the railway, and 2,071,942 marks from the mine; 4,490,928 marks net profit in 1911; 3,370,310 marks net profit for year ending March 31, 1913. Dividends were 11% on ordinary and 6 marks on deferred shares in the fiscal year 1909; 10% on ordinary and 5 marks on deferred shares in the fiscal year 1910; 8.5 marks per ordinary and 6.5 marks per deferred share in 1911; 6 marks per ordinary and 5 marks per deferred share in 1912; 8 marks on ordinary and 7 marks on deferred shares paid Aug., 1913.

Owms mining rights to 1,000 sq. miles, and 500 acres of freehold land in the Otavi district of German S. W. Africa, also 814 sq. miles, in strips of 10 kilometers width, along the right-of-way of the railway, the property including valuable farming lands, the farm Usakos having produced considerable revenue. The Tsumeb mine is the chief producer, but the property also includes the Otavi, Guehab and Asis, or Klein Otavi mines. The different mining properties carry copper and lead carbonates and sulphides, in dolomitic limestone, with good values in both lead and copper, and the ore, being complex, is mainly sent overseas for reduction.

The ore deposits are neither regular nor of large extent, but are profitable on account of their richness. The deposits along the railway line Otavi-Grootfontein have been entirely worked out and those near Asis, nearly so. The branch railway line to Arandis, built for the Khan mine, is completed, and that property is now a producer.

The Otavi Valley mines, include the Asis, Guchab and Groot Otavi mine, all now practically worked out. The latter opened to a depth of 300', has yielded large amounts of high-grade ore. The Guchab mine, at Kilometer 54 of the Otavi-Grootfontein railway, supplied rich silver-copper ore, 1,800 metric tons shipped 1908, averaging 33% copper and 0.04% silver. These mines all show eruptive rocks similar to that which has been found to be the ore bringer at Tsumeb and recent development work under a specially-

trained engineer is under way, in the hope of discovering new orebodies. Production was but 1,900 tons in 1912-13.

The Tsumeb mine, the largest and most productive mine owned, was discovered 1892, by natives, and taken over 1901, by this company. The Tsumeb shows a large orebody that is a replacement deposit in limestone, adjacent to a mineralized, igneous rock. The main orebody is of 310 meters proven length, with maximum of 23 and average of 9 to 10 meters width, so far as developed. The vein has a dip of 60 to 70°, carrying 2 exceptionally rich ore shoots, with a lean section between, the rich shoots both being wider than the lean part and showing a tendency to enlarge with depth. The mine has a strong gossan standing above the surface for some distance. Ores are copper oxides and carbonates, with some lead carbonate, succeeded at slight depth by argentiferous chalcopyrite and galena, with occasional chalcocite, having a calcareous and arenaceous gangue.

Development originally was by shafts, changed shortly to opencast workings, but again changed 1908, to mainly underground development. The mine has 4 shafts, opened 1892-93, and 2 shafts sunk later. The Main shaft is 434', Old West shaft 160', New West shaft 225', Old East shaft 66', and another shaft of 180' depth. Levels are opened at depths of 65', 160', 225', 328' and 426'. The New West shaft has a 70-meter drift disclosing ore of even better average grade than is opened above. The orebody is opened for a horizontal distance of 310 meters, having 34 crosscuts, of 440 meters aggregate length, and a 20-meter winze, giving a total of about 4,000' of workings, estimated to show 313,000 metric tons of high-grade ore averaging 16% copper and 25% lead. In addition to the high-grade ore, there is an undetermined amount of what is termed low-grade ore, lying between the 2nd and 3rd levels, in an irregular lens, assaying 7 to 8% copper and 5 to 6% lead, with lime and sandstone gangue.

Development for 1912-13 comprised 32 meters of shaft sinking, 55 meters crosscut on the 5th level, with 47 meters drifting E. and 32 meters W., showing the orebody to be as large and even richer than above and opening up 100,000, tons of new ore that carries copper glance and galena. A drift 130 m. long on the 4th level developed a streak 0.6 to 4 meters thick of pay ore; the main 4th drift continued 67 m. struck a body of chalcocite, 18 meters long and 1 to 3 wide. The eruptive rock is 15.6 meters thick and all mineralized. The continuance of the extremely rich ore of the Tsumeb to the greatest depth opened offers great encouragement, ore values gaining rather than decreasing to the present depth of 434'.

The Tsumeb West mine is being developed and a deposit of mottranite was discovered 1912, from which 200 tons of copper and lead-bearing vanadium ore was shipped containing an average of 10% vanadic oxide. Company secured an option 1912, on the Otjivarongo copper deposit.

Equipment includes a new central electric power plant driven by a Diesel engine and a new duplex hoist good for 1,000' with an old 180-h. p. steam plant and 100-h. p. electric plant, with two 60-h. p. hoists, good for depth of 400' each. Fuel is coal and wood.

A pumping station at Otjikotosee, 20 kilometers from the Tsumeb, sends water through a high-pressure line to a large reservoir at the mine. A 50-ton concentration plant has been ordered to treat the low-grade ore of the eruptive rock.

The smelter, at the Tsumeb mine, of 50 tons rated daily capacity, has 2 small blast furnaces. Iron ore for fluxing is obtained from Kalfeld, near Kilometer 308 of the railway. Fuel is charcoal and coke, latter costing 90 marks per metric ton delivered, an almost prohibitive price. The smelter ran 112 day for the fiscal year ending March 31, 1913, the high value of the

Tsumeb ore and high price of copper making its exportation more profitable than local smelting. The smelter produced 655 tons of matte carrying 48% copper, 25% lead and 420 grams silver per ton. The lead bullion produced amounted to 400 tons of 98% lead and 910 grams silver per ton.

Production for 1910-11 was: 31,600 tons of ore shipped carrying 16% copper, 24% lead and 290 grammes silver; smelters produced 2,220 tons 45% copper matte and 2,040 tons lead bullion. During 1911-12, 29,600 tons was shipped carrying 16% copper, 25% lead and 270 grammes silver per ton, and smelters produced 91 tons copper matte and 913 tons lead. In 1912-13, 44,550 tons was shipped carrying 13% copper, 25% lead and 230 grammes silver, the lower metal content being due to 8,000 tons of old dump ore shipped. Production for April-Sept., 1913: 25,560 tons ore against 21,600 tons for same period, 1912; 507 tons copper matte against 255 tons, 1912; 45 tons lead against 215 tons, 1912.

Company has a splendid management, both financial and technical, and the Tsumeb mine has given really marvelous returns for the limited development work and has now better ore in sight than at any previous time.

OTTER COPPER CO., LTD.

SCOTLAND

Office: 105 St. Vincent St., Glasgow, Scotland. J. Kenneth, H. H. Scott, J. S. Taylor and I. G. Findlay, directors. Organized in Edinburgh, March, 1912, capitalization £18,000, shares £1 par. Company is developing copper mines in Argyllshire, Scotland.

OTTO LÜCKE FABR.-UND MINERALWERK.

GERMANY

Mine office: Hadamar, Hessen-Nassau, Germany. Organized 1879. Lands, 300 acres, in the Westerwald, including the Oscar, Niederzeuzheim, Schiller, Göthe, Joseph III, Adolph II, Hellersberg, Rollsborg, Jacob, Christian, Dorchheim, Bruch, Schiefer, Frühling, Eiskeller, Josephine and Waldmannshausen mines, carrying ores of copper, iron manganese and sulphur.

OUASTA ET DE MESLOULA; COMPAGNIE DES

MINES D'.

ALGERIA

Office: 60 Rue de la Victorie, Paris, France. Mine near Meskiana, Ain-Beida, Constantine, Algeria. G. Mirabaud, president. Organized Jan. 6, 1903, under laws of France, capitalization 1,500,000 francs. Mine yields a complex sulphide ore carrying zinc and copper.

OUED-MOUGRAS COPPER & IRON CO., LTD.

ALGERIA

Idle. Office: 135 Wellington St., Glasgow, Scotland. Mine office: 5 Rue Lemercier, Bône, Constantine, Algeria. T. T. Stewart, chairman; John Alston, T. Hunter, C. S. Mair and D. Bruce Allan, directors; J. A. French, sec. Organized Oct. 9, 1903, under laws of Great Britain, as a reconstruction of a company of the same name, capitalization £12,500, increased, July 12, 1907, to £30,000, shares £1 par; issued, £24,243.

Property, a partly developed iron-copper mine, acquired from Chas. S. Mair of Tigh-na-Mara, Bona, Algeria. No recent reports received.

OUENZA; SOCIÉTÉ CONCESSIONAIRE DES MINES D'.

ALGERIA

Office: 24 Rue Mogador, Paris, France. Mine office: Morsott, Constantine, Algeria. MM. Cardozo, Taraud, Kroller, Pascal, Richard, Portalis, Muller, Vêrane and Vicomte Saint-Jouan, directors. Organized June 18, 1903, under laws of France, capitalization 2,500,000 francs, shares 500 francs par.

Property is the Djebel Ouenza mine, on the Tébessa railway, 25 kilometers from Clairfontaine, near the Tunisian frontier. The property shows an immense gossan of cupriferous hematite, carrying granules and flakes of argentiferous malachite ore which with selection carries 2 to 8% copper. The gossan is hematite, of high grade, valuable for iron, regardless of its copper contents, but presumably at depth will be succeeded by basic copper

ores, or more likely by the sulphide complex of copper, lead and zinc, typical of most Algerian copper deposits.

A leaching plant built on the bank of the Melleéque river, about 4 kilometers from the mine was not a success, owing to poor transportation facilities and rather poor practice. It was proposed to build a railway to the mines and work them for iron ore, also to remodel the leaching plant in another effort to extract the copper values. Mine considered promising both for iron and copper.

OUTOKUMPU COPPER MINE.

FINLAND

Address: Outokumpu, Kuusjarvi, Finland. According to the British Consul at Helsingfors, this property, opened in 1912, has 80,000 tons of ore in sight, valued at £238,100, or \$1,157,166, and zinc worth £37,800, besides having probable ore valued at £3,000,000 and possible ore at £8,000,000, which is interesting if true, as it would class it as the world's largest single copper deposit.

OVERFLOW MINES, N. L.

NEW SOUTH WALES

Idle. Office: 18 Bridge St., Sydney, N. S. W., Aus. Mine near Bobadah, N. S. W., Aus. T. H. Palmer, manager, at last accounts. Ores carry gold, silver, lead and copper, latter being produced merely as a byproduct. Has a Ball mill, 40-ton cyanide plant and 50-ton smelter.

OVOCA COPPER SYNDICATE.

IRELAND

Secretary and office: W. Smith, 10 Austin Friars, London, E. C., Eng. Mine office: Ovoca, County Wicklow, Ireland. Maj. Ralph P. Cobbold, chairman; Capt. F. B. Lawson and L. F. Hirschler, directors. Organized Nov. 27, 1901, under laws of Great Britain, capitalization £12,000, shares £1 par; fully issued and paid. Accounts for year ending 1911, showed £1,040 loss.

Property, the old Cronnebane mines, in the Vale of Ovoca, which were making about 1,250,000 lbs. refined copper yearly, at the end of the eighteenth century. Mines were closed 1875, and reopened 1902, on the advice of Mr. Philip Argall. High-grade oxidized ores were mined out in past operations, but the vein, about 50' in average width, shows immense bodies of low-grade disseminated chalcopyrite with quartz gangue, estimated to average 3% copper, 1.5% zinc, 1.5 oz. silver and 1 dwt. 6 grains gold per long ton. A new shaft was sunk, and 838 tons of concentrate shipped in 1909-10 that realized £600. Property considered promising. No recent returns secured.

PAIPOTE SMELTER (FUNDICION DE PAIPOTE).

CHILE

Owned by Yelaya Hermanos at Paipote, Atacama, Chile.

PAISLEY MINE.

QUEENSLAND

Mine address: Muldiva, Lynd Co., Queensland. Property is a copper-silver-lead prospect, slightly developed by opencuts and a long tunnel. Is a small shipper and under development, Aug., 1913.

PALQUI; COMPAÑIA MINERA EL.

CHILE

Mine office: El Palqui, La Ligua, Aconcagua, Chile. Mine, 12 miles from Cabildo, has a mantos, or blanket vein, of about 17' thickness, showing an abundance of ore of 5 to 6% average copper tenor, but is handicapped by transportation charges averaging 6.65 pesos per metric ton to the Cabildo smelter. Idle.

PANULCILLO & CONDENSA COPPER MINES & SMELTING WORKS.

CHILE

Is owned by the Central Chile Copper Co., which see.

PARAMATTA & YELTA MINES.

SOUTH AUSTRALIA

Mine office: Wallaroo, Daly Co., So. Aus. South Australian Government, owner. Frank Richards, manager. Lands, 1,350 acres, including the Para-

matta, Yelta, Wheal Hughes and Wheal James mines, which together with the smelter were purchased by the State government for £6,000 in 1911.

Property shows felsite porphyry, carrying 3 known veins, dipping from 60 to 70° and averaging about 3' in width. Ores are mainly chalcopyrite, with a little bornite, and a gangue of quartz and silicious feldspathic material. The Yelta ores also carry a high percentage of iron.

The Paramatta mine is an old producer, adjoins the Moonta, and has a main shaft 816' deep, equipped with modern machinery.

The Yelta, the principal mine, is situated about 1 mile N. of the Moonta, and presumably carries the extensions of the several veins worked in that famous property. There are 3 veins, the main vein opened by a 1,200' shaft, unwatered to 1,080' in 1912, showing the vein to have an average width of about 6', with ore of about 5% copper tenor. Property was extensively diamond drilled 1912, and 968' of prospecting work and ore development was done in the year ending June 30, 1912.

The smelter, at Yelta, is connected with the Paramatta by a tramway, and has a 60-ton blast furnace, making 30 to 40% matte. The concentrator, built of stone, has a Blake crusher, rolls, and 5 Wilfley tables.

Equipment at the mines includes 4 hoists, good for depth of 2,000', and 3 air compressors, with capacity for 25 drills.

Production for 6 months ending June 30, 1912, was 2,244 tons of 5% ore, with half as much more broken, but held under ground.

PAULL'S CONSOLIDATED MINE.

NORTHERN TERRITORY

Office: Leigh's Creek, N. T., Aus. Property, formerly known as the Friend mine, on Burr creek, 1½ miles N. of Burr well, in the Mount Lyndhurst district, has a vein of 4 to 10' width, carrying copper carbonates and gray ore, and is said to also carry vanadium ore at shallow depth. Development is by numerous pits and shafts, of 15 to 100' depth, and a 300' incline shaft, with levels at 90', 150', 200' and 250', having about one-half mile of workings, in ore reported to show some chalcocite. The vein carries rich seams and stringers of 1 to 4" width, with low-grade ore between. Equipment includes a small mill, but ore is dressed by hand and a limited production was being secured, 1912.

PEÑA COPPER MINES, LTD.

SPAIN

Secretary's address: R. L. Rodger, 736 Salisbury House, London, E. C., Eng. Mine office: Nerva, Huelva, Spain. C. C. D'Anvers, chairman; Dr. N. Brückner, deputy chairman; M. Paisant, Nicol Brown, H. Schmitz, A. Harter and C. A. Massaouti, directors; Enrique Schreck, mine mgr. Organized Sept. 19, 1900, under laws of Great Britain, and capitalization increased, Jan., 1905, to £600,000, again increased Nov., 1911, to £750,000, shares £1 par; issued £537,600. Debentures, originally £200,000 authorized and £193,800 issued, at 5%, have been reduced to £8,900. Net profits for fiscal years were £17,293 in 1905; £45,697 in 1906; £19,522 in 1907; £29,792 in 1909; £21,944 in 1910; £24,199 in 1911, and £25,752 in 1912. £12,000 in bonds were retired 1912, leaving a balance of £13,752, as compared with £24,199 the year previous. Dividends were 5% in 1903; 5% in 1904; 4% in 1905, and 7½% in 1906, since when no dividends have been paid, the company wisely reserving its profits to meet future financial requirements.

Lands, about 1,721 acres, 2 miles N. E. of the Río Tinto mine, known as the Peña del Hierro group, consisting of 17 old mines, taken over from the Sociedad Peninsular de Brussels. Extraction is mainly opencast and large quantities of overburden are removed, stripping having amounted to 195,430 cu. meters in 1905; 220,869 cu. meters in 1906; 174,324 cu. meters in 1907; 185,435 cu. meters in 1909; 1,104,437 cu. meters in 1910; 89,034 cu. meters in 1911 and 67,367 cu. meters in 1912.

The mine output for 1912 was 84,698 tons, compared with 131,367 tons in 1911, the decrease being due to inability to get railway cars for 3 months of the year.

Eventually the capping is to be removed almost completely, and the mine worked opencast, down to the 9th level. There is a limited amount of underground work in progress, the mine being opened to the 12th level. Ore reserves were estimated, Dec., 1912, at about 3,974,461, compared with 3,850,000 long tons in 1911.

Equipment includes a new central power plant, a crushing plant, shops and a number of dwellings. A $2\frac{1}{2}$ -mile private railway, equipped with 1 locomotive and 14 cars, connects the mines and works with the nearest public line, and a new railway 22 kilometers in length, connecting the mines with the port of Seville, was nearly completed, 1913.

Ores produced are divided into cupriferous pyrite, pyrite and washed sulphur ore, latter being ore previously leached for copper and sold for sulphur contents.

The cupriferous pyrites of the Sierra Morena lend themselves with special facility to copper extraction by a combination of natural weathering and artificial leaching, and this process, in use by the Peña, gives cheap costs, but entails heavy investments and long waits before profits are returned, a term of 4 to 5 years being required for the complete extraction of copper values. Occasional dry seasons cause a scarcity of water, restricting production, as in 1907, and again in 1909.

Production was 1,397,760 lbs. fine copper in 1902; 2,199,680 lbs. in 1904; 1,724,800 lbs. copper and 110,000 long tons of leached ore, sold for sulphur, in 1905; 2,421,440 lbs. copper in 1906; 2,036,160 lbs. in 1907; 2,636,480 lbs. in 1908; 2,358,720 lbs. in 1909; 2,278,080 lbs. in 1910; 2,248,960 lbs. in 1911, and 1,776,520 lbs., produced as cement copper, in 1912. Shipments have been as follows:

	Cupreous ore.	Washed ore.	Non-Cupreous ore.	Total shipments.
1898-1910.....	146,350	837,921	235,984	1,220,255
1911.....	16,751	49,334	58,238	124,323
1912.....	20,201	25,425	35,218	80,844

Property considered valuable and management good.

PENRALLT COPPER MINE.

WALES

This old mine in North Wales was reported sold to an English syndicate, 1913, which proposed opening the old workings. Like numerous other projects to reopen old mines, this must be regarded as a doubtful enterprise.

PEÑUELAS; SOCIEDAD ANONIMA MINAS DE.

SPAIN

Office and mine: Paimogo, Huelva, Spain. José Maria Soto y Rosso, chairman; Miguel Borreo Morón, vice-chairman; Mateo Santos Mora, sec.; Gregorio Peres Diaz, treas. Organized July 19, 1898, under laws of Spain, capitalization 12,600 shares, all issued.

Land, 500 hectares, in the Paimogo district, showing slate and granite, with numerous fissure and contact veins, 1 under development is of 4' estimated average width and has oxidized ores, succeeded at slight depth by chalcopyrite said to give average assays of 15.34% copper. The mine is developed by shafts of 200', 30', 60' and 50', and by tunnels of 150' and 130'. The deepest shaft is bottomed in slate carrying a slight impregnation of cupriferous pyrite, and it is obvious that the lens of ore is shallow.

Equipment includes an 18-h. p. hoist and there are 17 dwellings for workmen. The mine is served by Tharsis railway. Idle since 1907.

PERCY RIVER SYNDICATE.

QUEENSLAND

Office: Irvinebank, Queensland, Aus. Mine office: Ortona, Gilbert Co.,

Queensland, Aus. G. C. Young, sec.; John Moffat and A. Linedale, owners; Jas. Puxley, gen. mgr.

Lands, 5 leases, 130 acres, known as the Ortona mine, and an 80-acre smelter site lying along the southern bank of the Percy river, about 5 miles above its junction with the Gilbert river. Property carries 11 fissure veins in diorite with E.-W. strike and dip of 55 to 87°. Eight veins, under development, estimated to average 2' wide, carry malachite, cuprite and chalcocopyrite ore, averaging 15% copper, 10 oz. silver, and from a trace to 5 dwts. gold per long ton. Development is by the 225' No. 1 shaft on vein No. 1; 165' No. 2 shaft on vein No. 2; 55' No. 3 shaft on vein No. 3; 70' No. 5 shaft vein No. 5; 176' No. 6 shaft on vein No. 6; 25' No. 7 shaft on vein No. 7; 130' No. 8 shaft, on what is known as No. 2 West Lode. The workings are mainly on No. 2 vein, where there is a 12-h. p. hoist. The company also has 3 veins on the Caledonia group, 10 miles south of Ortona.

PEREZ; FRANCISCO DE PAULA.

CHILE

Mine office: Los Condes, Santiago, Chile. Works office: Ñuñoa, Santiago, Chile. Property includes La Central mine, opened 1880, adjoining the property of the Compañía Esplotadora Los Bronces, developed by a tunnel driven jointly. Company also owns the Mina Disputada and the San Agustín mine, developed by tunnel. Ores average, after selection for smelting, about 23% copper.

The smelter, known as the Fundición La Central, has a matting furnace only.

PERU MINES & ESTATES, LTD.

PERU

Secretary and office: W. J. Chivers, 39 Lombard St., London, E. C., Eng. Mine office: Huaraz, Ancachs, Peru. W. Blount, A. Gandolfi and H. R. Willats, directors. Organized April 8, 1909, under laws of Great Britain, capitalization £150,000, shares £1 par; fully issued and fully paid. The company owns sundry oil, gold, silver and a 1,360-acre copper mine, in the Huaylas valley, Ancachs, Peru, formerly held by Hudsons Cons., Ltd.

PERUVIAN DEVELOPMENT SYNDICATE, LTD.

ENGLAND

Liquidated voluntarily, 1911.

PERUVIAN MINING, SMELTING & REFINING CO.

PERU

Office: 400-55 Congress St., Boston, Mass. Mine office: Morococha, Junín, Peru. Mine office: Río Blanco, Huarochirí, Lima, Peru. Julio L. East, general manager. Organized July 16, 1906, under laws of Maine, capitalization \$5,000,000, shares \$5 par; issued \$4,000,000. Bonds, \$950,000 outstanding, at 7%, convertible. Is controlled, through \$1,000,000 stock ownership, by the United States Smelting, Refining & Mining Co.

The Churruca mine, in the Sierra de la Santa Cruz, near Morococha, at an elevation of 15,500' above sea level, was bought 1907, of the Compañía Minera Churruca. The mine has a large lens of massive chalcocopyrite, with gangue of brecciated country rock of metamorphic calcite. Ore is said to average 9% copper, with considerable gold and silver contents, but probably this figure is for selected ore. The mine is opened by the Grau and Roland East tunnels.

The smelter, fully described Vol. X, was sold 1912, to E. E. Marshall, Lima, Peru, and the company's property reported foreclosed under a mortgage, 1913.

PHILLIPS RIVER GOLD & COPPER CO., LTD.

W. AUSTRALIA

In liquidation March, 1913, L. W. Hawkins, liquidator, Basildon House, Moorgate St., London, E. C., Eng. Fully described Vol. X.

PHENIX MINES (CORNWALL), LTD.

ENGLAND

Secretary's address: H. M. Willis, 24 Walbrook, London, E. C., Eng. Mine office: Liskeard, Cornwall, Eng. J. H. Gretton, chairman, and D.

Richards, C. C. Baker, R. J. Hoffman, J. Barry, C. Wanklyn, H. J. Moir, directors. Organized June, 1909, capitalization £116,000, increased, 1912, to £210,000; shares £1 par; fully issued, there being 50,000 preferred and 160,000 common shares.

Company has a 31-year lease, dating from March 25, 1907, on 700 acres of copper and tin-bearing land, about 7 miles N. of Liskeard, the terms of the lease calling for the payment of a royalty of one-thirtieth of all tin and copper produced. The royalty is payable to the Duchy of Cornwall for a period of 15 years dating from March, 1912.

The mine was extensively worked during the last century. A new working shaft, planned to intersect the lode at about 1,020', was being sunk 1912, and a reduction plant of 400 tons daily capacity is to be erected.

PHENIX MINING CO.

CHILE

Office: Valparaiso, Chile. Mine office: Tocopilla, Antofagasta, Chile. Organized April 18, 1905, under laws of Chile, capitalization 250,000 pesos, shares 100 pesos par. Jas. L. Bennett, manager, at last accounts.

Property, 15 acres of mineral land, 3 miles from Tocopilla, and 7 acres at the port of Tocopilla, former including the Santa Rosa mine, developed by a 320' tunnel; the San Pedro mine, having a 20-h. p. hoist; La Teresa mine, having a 25-h. p. Fairbanks-Morse hoist and a Blake crusher, and La Colorada mine, these properties carrying a little oxidized copper ore, but mainly chalcopryite.

Equipment includes 2 Babcock & Wilcox boilers, burning petroleum, and a small Ingersoll-Rand air compressor. La Colorada mine is connected by ground tram with the Anglo-Chilian Nitrate & Railway Co.

PILOU MINE.

NEW CALEDONIA

Mine office: Ouegoa, Arama, New Caledonia. Lands, in the vicinity of the Ao and Balade mines, in the northern part of the island, have a main vein with principal ore shoot at the intersection of a cross vein, proven to a depth of 240 meters, though with greatly diminished copper values at depth. Ore carries chalcopryite, with some galena, the richest ore returning 10 to 12% copper and 600 to 650 grams silver per metric ton. The mine has considerable ore of 6 to 4% copper tenor and was estimated 1889, to have 40,000 metric tons of low-grade ore in sight. The property was owned formerly by the Caledonia Copper Co., Ltd., and Les Mines de Cuivre Pilou, Ltd.

Equipment includes an old 250-ton concentrator, formerly making concentrates of 12 to 18% copper tenor. Presumably idle.

PISHMINSKO-KLUCHEVSKI WORKS.

RUSSIA

Office: Quai Tutschkof 18, St. Petersburg, Russia. Mine and works office: Verkh Issetzki, Ekaterinburg, Perm, Russia. Is owned and operated by Count Stenbok-Fermor's Estate. Property shows several veins in gabbro-diorite, principal orebody being a vein of chalcopryite averaging about 10% copper. The mine has 6 shafts, with 8 small steam engines and employs about 1,000 men. Production was 868,188 lbs. fine copper in 1905; 1,099,104 lbs. in 1907; 1,726,984 lbs. in 1908; 2,210,523 lbs. in 1909; 3,105,718 lbs. in 1911, and 3,900,204 lbs. in 1912.

PITKÄRANTA KOPPARBRUK.

FINLAND

Owned by Ladoga Lake Mining & Smelting Co., Ltd., at Pitkäranta, Viborg, Finland. Fully described Vol. VIII.

PLAKALNITZA MEDNA PLANINA.

BULGARIA

Office: care of Fils A. Mavrokordato, owners, Constantinople, Turkey. Mine office: Plakalnitza, Vratza, Bulgaria. Lands, 5 miles from Elisena, on the Sofia-Vratza line, are held under a concession from the Bulgarian crown. Property shows bornite, tetraedrite, malachite and chalcopryite ores in

lenticular-shaped masses in dolomite. The ore-bodies range from 3 to 10' in thickness, and are said to average 5 to 7% copper. Mine is opened by a 220' shaft. Equipment includes a small concentrating plant and a 7-mile aerial tram, connecting the mine with a smelter.

PLURDALEN COPPER MINE.

NORWAY

Is owned by the Raven Copper Co., Ltd., which see.

PODEROSA DE CHUQUICAMATA; COMPAÑÍA MINERA. CHILE

Mine office: Chuquicamata, Calama, Antofagasta, Chile. Enrique Vilegas Encalada, gen. engr.; Manuel A. Rojas A., supt. Organized 1908.

Lands, on the Chilian desert, with difficult transport and hard conditions of living, include the Poderosa and Pánizo mines, former opened to depth of 150 meters and latter to depth of 130 meters. The mines show considerable brochantite and atacamite, also chalcopyrite and cupriferous pyrite, and have developed a good amount of concentrating ore. The Pánizo mine has a Blake crusher.

The mill, known as the Huamachuco works, built at a cost of 40,000 pesos, is at Huamachuco, in the vicinity of Calama, and employs 12 men. Equipment includes cylindrical trommels giving 5 products, passing rings of 25, 19, 12, 6 and 3 mm., fines constituting the greater part of the concentrates. There are 2 Ferrari tables, and a No. 4 Ball mill, run dry, yielding 4 to 8 metric tons daily of 2-mm. concentrates. Mill losses average about one-third of assay values, it being difficult to save the brochantite and atacamite when milled in combination with sulphide ores, owing to the light weight of the chloride and sulphate ores.

A hydro-electric plant, near the mill, transmits current 500 meters, and there is an auxiliary steam plant having a Babcock & Wilcox boiler and condenser.

Production is about 400 metric tons of ore from the Poderosa mine, and 275 metric tons of ore from the Pánizo mine, monthly, averaging 12.5% copper. The mill treats an average of 16 metric tons daily of ore assaying 5 to 6% copper and produces about 100 metric tons monthly of 17% concentrates, shipped partly to England and partly to the Tacoma smelter. Forces were 160 men, 1913. Property probably absorbed by Chile Copper Co., the new Guggenheim flotation, 1912.

PODEROSA MINING CO., LTD.

CHILE

Secretary and office: F. W. Bishop, 145 Dashwood House, New Broad St., London, E. C., Eng. Operating office: Casilla 855, Antofagasta, Chile. Mine office: Collahuasi, Tarapacá, Chile. Chas. Fearn, chairman; L. W. Harris, V. Echeverría and W. J. Barnett, cons. engr., directors; W. Watson and C. Crempien, mgrs. Organized Nov. 27, 1908, under laws of Great Britain, capitalization £500,000, shares £5 par; fully issued and fully paid. Paid a 5% dividend, amounting to £25,000, July 15, 1909. The property was taken over March 17, 1909, from the Compañía Minera Poderosa de Collahuasi, this company having been organized to bring the property under the laws of Great Britain, in order to make an English market for the shares, the former owner being paid £480,000 in stock, or 96,000 full paid shares, for its property. The old company earned a profit of £84,923 in 6 months ending June 30, 1908, and paid dividends of £60,000.

Lands, 37 contiguous claims, 185 hectares, or 457 acres, including the Poderosa, which is the principal producer, and the San Carlos, Rosario, Conдор and other mines. The lands lie at an extreme elevation of 15,400', among the rounded peaks on the western edge of the Bolivian plateau, a region above the timber line, and barren of vegetation, with the exception of yareta, which constitutes the fuel of the district. Copper mines were worked in this district during the era of Spanish dominion, and previously by the

Indians, as evidenced by remains of ancient furnaces, fragments of matte, scoria and tools left in old workings. Developments of the mines was begun 1903, and regular ore shipments were begun Jan., 1906.

The property shows the Poderosa, or main vein, a fissure without visible outcrop, lying alongside a diorite dike intrusive in dacite. The vein lies under the dike, but in places departs from it. It has numerous branches and parallel fissures. A fault with a horizontal shift of 50 to 100', lessening downward, separates the vein in 3 portions, worked in the Poderosa and San Carlos mines, respectively. The ore occurs in shoots and is quite rich, carrying 8 to 60% copper and 6 to 8 oz. silver.

The Poderosa mine has 510', 430' and 235' shafts, with a total of about 20,000' of workings, showing oxidized ores down to and including the 400' level. The workings develop 2 veins, known as the Poderosa and Portillo, of 3 to 30' width, carrying high-grade paystreaks of 1 to 20' width, with an average of 30", proven for length of 2,600' and depth of 500', yielding ore averaging about 18% copper and 8 oz. silver per long ton. The hanging wall is well defined, but the ore shades gradually into the altered country rock on the footwall, where there is an occasional gouge, and there is a fluccan of 3 to 12", and even up to 4' in width, on the hanging. The gangue being a decomposed dacite, is very soft, requiring heavy timbering. Levels are opened at 22-meter intervals and connected by winzes. The main shaft was only 6x8' inside of timbers, at last accounts. The mine is moderately wet, making about 90,000 gals. of water per day in the wet season, and is equipped with Gould's, Cameron and Riedler pumps. Rock is broken by 20 Murphy drills. Ore reserves of the Poderosa mine were estimated. Dec 1912, at 15,760 tons of 21% copper ore. About 2½ to 3 tons of material are broken underground to secure 1 ton of shipping ore.

The dressing plant at the Poderosa includes 9x18" and 6x20" crushers, breaking ore to 2 to 3" size, and there is a 75-cm. Robbins conveying belt, used for hand-picking, by which the ore is brought up to an average tenor of about 22% copper, for shipment.

The Rosario mine, N. W. of the Poderosa, has a 166' incline shaft, on a 30" vein dipping at about 80°, developing ore assaying about 15% copper, shaft being bottomed in the top of the base zone, which shows chalcopyrite, arsenopyrite and pyrite.

The San Carlos mine, practically an extension of the Poderosa, and to be connected therewith, has a 146' shaft, showing a 3' vein carrying ore averaging 19% copper.

The Venus mine has a 2' vein carrying ore giving average assays of about 18% copper.

The new power plant has a 14x52-metre building, equipped with 3 multi-tubular boilers, working under 150-lbs. steam pressure, two 100-kw. generators for supplying power to the shops and lighting the mine, and a 5-drill Riedler air compressor. There are 3 steam hoists, 1 a 100-h. p. Fraser & Chalmers engine, and 1 a 100-h. p. 10x15" Tangye double-cylinder hoist raising half-ton buckets with a seven-eighths-inch steel cable. Fuel is mainly yareta, costing only £1 per ton, with a calorific value about 50% that of coal briquettes, which cost £4 10s. per ton, delivered, and hence are but little used. The company also has a Sullivan diamond drill.

Buildings include machine and carpenter shops, a smithy, office, and adobe dwellings for native workmen. The management is considering building a concentrator, and the matter of building a smelter was considered 1909, but decided adversely, as the cost of fuel and all operating expenses would be extremely high at the mine, and the ores have an excess of silica, while readily available fluxes are lacking.

Property was explored, 1911, by diamond drilling, 16 holes being sunk, aggregating 2,444', deepest 301'. This work cost \$9.05 per foot.

Labor is supplied mainly by Bolivian Indians, from the neighboring republic, who work intermittently, putting in about half time. The labor supply has been improved by the advent of the railway.

Costs for 1911 were £129,740, including £5,756 charged off for depreciation and £11,272 for development work. The net loss on the year's operations was £16,995. The average cost per long ton of dressed ore, f. o. b. Poderosa, was £6.2, and the cost of mining and marketing per ton of copper was about £56.

Production in recent years has been as follows: 1909, 10,595,200 lbs. copper; 1910, 10,902,080 lbs.; 1911, 6,419,392 lbs.; 1912, 5,077,204 lbs.

POLARSTERN; GEWERKSCHAFT.

GERMANY

Office and mine: Wallau, Biedenkopf, Wiesbaden, Prussia, Germany. Jacob Donges and Jacob Velte, owners. Organized Jan. 4, 1900, under laws of Prussia, capitalization 20,000 marks.

Lands, 218 hectares, showing an orebody of about 3 meters average width, with E.-W. strike, traceable 4,000 meters, proven to depth of 20 meters, by 10 pits, carrying malachite, chalcopryite and galena, associated with pyrite, estimated to average 13% copper and 13% lead, with gold values undetermined, and with good sulphur values. There is no equipment. Property is for sale for 60,000 marks.

POLIEFF-SYSSERT SMELTER.

RUSSIA

At Nijni-Tagilsk, Perm, Russia.

PORSA KOBBERBRUGER; AKTIESELSKABET.

NORWAY

Mine office: Porsa, Altenfjord, Finmarken, Tromsø, Norway. Ingolf Bjornstad, manager. The Porsa mine was under development, with promising indications, at last accounts. Property also includes the Vesterdalens mines, at Naeverfjord, Finmarken, Tromsø.

PORT KEMBLA SMELTER.

NEW SOUTH WALES

Owned by Electrolytic Smelting & Refining Co., Ltd., Port Kembla, N. S. W., Aus.

PORT LINCOLN COPPER CO., LTD.

SOUTH AUSTRALIA

Secretary and office: R. G. Orr, 731 Salisbury House, London Wall, London, E. C., Eng. Mine office: Reedy Creek, Robe Co., South Aus. J. H. Smith, chairman; A. D. Hunter and H. Sturton, directors. C. Lowe, mine mgr.; Laurence Pitblado, cons. engr. Organized July 13, 1906, under laws of Great Britain, capitalization £350,000 shares, £1 par; fully issued, £250,000 fully paid, and £95,000 paid 15s. Last assessment was 2s. 6d., Feb. 22, 1909. Statement of June 30, 1912, gave cash £1,347, calls in arrears £8,612, creditors £3,832.

Owens the Kitticoola mine, on Tumby bay, N. of Port Lincoln, about 35 miles N. E. of Adelaide. The mine, opened 1845, under the name of Tung-killo, was idle from 1852 until 1890, when taken up by the Reedy Creek Gold Mining Syndicate, and has been known at various times also as the New Reedy Creek, Great Wheel Orford and Kitticoola mine. This property, worked originally for copper, and subsequently for both copper and gold, is the second oldest copper mine in South Australia.

The mine has an orebody, split at surface into the North and South lodes, ranging up to 11' in width, carrying melaconite, bornite and chalcopryite ore that is rich but bunchy, assaying about 18% copper and 4 dwts. 6 grains gold per ton, presumably after selection. The mine has a 420' incline main shaft, with levels at 180', 240', 300', 330', 360' and 420'.

Equipment included three 60-h. p. boilers, 2 hoists, a 20-drill Taylor-Horsefield air compressor, and a 6-drill Rand air compressor, at last report.

Buildings include an office, machine shop, smithy, carpenter shop, warehouse, laboratory and changing house.

The reduction plant includes a 10-stamp mill, having a crusher, Wilfley table, Warren vanner and a Mays double jig. There is a small smelter, having a calciner, reverberatory furnace, and a 45-h. p. engine. The mine is let on tribute.

PORVENIR SMELTER.

CHILE

Owned by Geisse Hermanos; at Tocopilla, Coquimbo, Chile.

PREDAZZA OSS MAZZURANA, KUPFERGEWERKSCHAFT.

AUSTRIA

Is owned by the Retia Mining, Power & Railway Co., Ltd., which see.

PRETORIA COPPER & TIN FIELDS, LTD.

TRANSVAAL

In liquidation. Geo. McKenzie and Harry Cohen, liquidators, Johannesburg, S. Af. Described Vol. X.

PROAÑO; LIZANDRO A.

PERU

Office, mine and works: San Mateo, Pacococha, Huarochirí, Lima, Peru. Lands, 512 hectares, with 64 small mines, including 1 flux mine. Property includes 37 mines, with 176 pertenencias, 352 hectares, in the province of Huarochirí, department of Lima, and also 27 mines, 130 hectares, in the province of Yauli, department of Junín. Properties include the Germania, Siberia, Peru, Zambita, La Purísima, Siete de Octubre, Belgica and Cuarto, in the vicinity of Pacococha; Huáscar and the Peru de Viso, at Viso; 26 de Agosto and Chaupichaca, at Aruri, all in the province of Huarochirí, all carrying chalcopryite, more or less argentiferous.

The Germania, Siberia and Peru mines, with combined area of 74 hectares, are worked jointly, employing an average force of 120 men.

The Germania mine, opened 1887, but worked superficially until quite recently, is at Pumagrande, Huarochirí, 17 kilometers from the smelter. The mine workings developed a 5' fissure vein in decomposed hornblende andesite carrying a paystreak of chalcopryite and galena with accessory sphalerite and pyrite, in a quartz gangue, averaging 8% copper, 7% lead and 4% zinc with good silver values and a little gold. Development is by tunnel. The Germania is estimated to have developed nearly 1,000,000 tons of probable and possible ore, carrying 80,000 metric tons of copper, 2,895,000 marcos of silver and 50,000 oz. gold. The mine is capable of a production of about 200 metric tons of ore daily. The physical composition of the ore does not permit wet concentration. The Germania has an old smelter of about 20 tons daily capacity, not in present use.

The Siberia mine has a vein of about 5' average minimum width, parallel with the veins of the Germania and Peru, opened by No. 1 tunnel of 85 meters, No. 2 of 60 meters, No. 3 of 40 meters, and No. 4 of 35 meters.

The Mina Peru has a vein paralleling those of the Germania and Siberia, carrying about 8% copper and up to 25% lead, with about the same silver values as in the Germania. The Peru has been estimated to have in sight about 500,000 metric tons of ore, estimated to carry 40,000 metric tons of copper, 125,000 metric tons of lead, 1,447,528 marcos silver and 25,000 oz. gold.

The Purísima and Purísima Segunda mines, in the vicinity of the Germania, Siberia and Peru, have veins of about 5' width, carrying silver-copper and lead ores in the Purísima Segunda, and silver-lead ore in the Purísima.

The Mina Huáscar, in the vicinity of Tamboraque, has copper and lead sulphides, latter sparingly, carrying good gold and silver values.

The Mina Victoria, 64 kilometers from the smelter at Tamboraque, with rail connection, carries chalcopryite and sphalerite, with small quantities of galena, all strongly argentiferous, estimated to average about 10.75%

copper, 0.45% lead and 24% zinc. The mine is estimated to show about 200,000 metric tons of mixed ores, and has necessary mine buildings.

The Mina Peru de Viso, showing extensive ancient workings, has a vein of about 6" width, carrying ore said to average 7 to 8% copper and 217 oz. silver per metric ton.

The 26 de Agosto and Chaupichaca mines, are adjoining properties, in the vicinity of Aruri, not far from the smelter, developed by tunnel, yielding mainly silver-lead ores.

Equipment includes a Pelton wheel at the Germania group, operating a 60-h. p. dynamo actuating 10 Ingersoll electro-pneumatic drills, and furnishing light for the mine. There are dwellings for about 150 workmen.

Transportation is partly by rail, but is mainly by llamas, which bring in ore from the mines at Pumagrande and Pacococha; about 2,000 llamas being used for transport.

The smelter, known as the Fundición de Tamboraque, is in the pueblo of San Mateo, near the Rio Blanco smelter of the Peruvian Mining, Smelting & Refining Co., at an elevation of 9,826' above sea level, 120 kilometers from Callao, on the Ferrocarril Central del Peru. The works occupy a site of 34,393 sq. meters, or nearly 9 acres, allowing ample room for extension. The plant, formerly of about 40 tons daily capacity, was rebuilt 1908, to the present capacity of 200 metric tons daily. Equipment includes a 50-ton crusher, 50-ton Humboldt rolls, a No. 8 Krupp ball mill, of 1 metric ton hourly capacity, and a Humboldt cylindrical perforated classifier. The works include kilns for calcining, and a 60-ton Brown calcining furnace, connected with a 10x180' subterranean dust flue, burning petroleum, which reduces the sulphur contents of the ore, originally averaging 26%, to about 6%, and 4 McDougal calciners were installed 1910.

The smelter has 3 water-jacket blast furnaces, made in Peru, a 30-ton circular furnace being used for casting, a 50-ton furnace for smelting copper ores, and a 120-ton furnace for smelting lead ores. Copper product is matte, carrying 30 to 40% copper and 250 to 300 oz. silver per metric ton, exported via Callao. The works include a briquetting press, and fuel is German coke and crude petroleum from Talara. Limestone for flux is secured from Carray, 11 kilometers distant by rail.

The 200-h. p. smelter power plant consists of 3 Pelton wheels, taking water by a 3,000' canal, from the Rio Rimac, which furnishes a steady supply during the entire year, and is capable of developing 500 h. p., Sr. Proaño having a concession for 1,900 liters. It is planned increasing the installation by 150 h. p. There are Nos. 5 and 6 Connorsville blowers for smelter blast.

Buildings at the works include a good laboratory and a warehouse, and a hospital is maintained, for employees and their families.

Production is about 1,000,000 lbs. copper, 500,000 lbs. lead and 3,000 kgs. silver per annum.

The mines and works of Sr. Proaño are interesting, not only because of their present importance and future promise, but also because constituting an exceptionally fine example of a thoroughly successful mining and metallurgical enterprise, conducted along sound lines, by a native of a country in which nearly all of the great mining enterprises are in the hands of European or North American managements.

**PRUNELLI (CORSE); SOCIÉTÉ ANONYME FRANÇAISE
DES MINES DE CUIVRE DE.**

CORSICA

Office: 51 Rue Vivienne, Paris, France. Mine office: Marignana, Corsica, France. Organized Dec. 29, 1906, under laws of France. capitalization 1,500,000 francs, shares 100 francs par. Lands include the Argentella group, carrying silver-copper ores associated with sulphides. Idle.

PÚQUIOS; COMPAÑÍA MINERA DE.**CHILE**

Office: Casilla 178, Valparaíso, Chile. Mine office: Atacama, Chile. E. J. J. H. Sandiford, chairman; P. H. MacClelland, vice-chairman; H. S. Sydney-Merritt, sec.-treas.; preceding officers, J. G. Kenrick and Walter Squire, directors; Archibald Stark, gen. mgr.; R. Benbow, mine supt. Organized Nov. 7, 1905, under laws of Chile, capitalization £100,000, and reorganized Jan. 8, 1906, capitalization £80,000, shares £1 par.

Lands, 44 claims, 144 hectares, show diorite cut by 3 fissure veins, with E.-W. strike, known as the Jefe, Repalon and Estaca lodes. These veins are intersected at nearly right angles by the Verde, Sofia and Farellón lodes. The intersection between the Jefe and Verde lodes has an ore shoot 30' wide. The Sofia and Jefe lodes are under development, latter, of 4' average width, traceable 2,500 meters, showing bornite and chalcopyrite ores with estimated average assays of 12% copper and up to 24 oz. silver per long ton, and traces of gold.

Development is by the old Farellón shaft of 693' the Estaca shaft of 595', the new Sofia shaft of 429', also by the 610' Sofia South tunnel, 612' Jefe East tunnel and 500' Jefe West tunnel, with a total of 3,140' of new workings, estimated to show 3,000 long tons of ore, with 1,100 tons blocked out for stoping.

Equipment includes 2 hoists, good for 900' each, and 2 Rand and Walker air compressors. There are several buildings, including an office, hotel, store and dwellings. Ores were sent to Caldera for reduction by the Ferrocarril de Copiapó, connected with the mine by a Bleichert aerial tram of 2 kilometers length. Fuel is Australian coal, costing 55s. per long ton.

Production was 295 metric tons of ore, from development work only, yielding 104,000 lbs. fine copper, 1907, giving an average return of 14.7% copper. The property experienced all sorts of trouble during 1908-09, and very little work was done for several years, but company was developing, with a small force at last accounts.

QUEBRADA; MINAS LA.**VENEZUELA**

Owned by South American Copper Syndicate, Ltd., Aroa, Venezuela. **QUEEN BEE COPPER MINING CO., N. L.** **NEW SOUTH WALES**

Head office: Australasia Chambers, Martin Place, Sydney, N. S. W., Aus. Mine in Robinson Co., N. S. W. Joseph Vickery, chairman; S. Pearl, S. Richards, J. R. Ratcliffe, T. E. Farquhar, directors; G. A. Loxton, mine mgr.; J. E. Crocker, legal mgr. Organized Dec. 15, 1903, and paid 13 dividends, aggregating £16,625, to Dec. 31, 1907. The company has been somewhat handicapped by lack of capital.

Lands, in the Bee mountains, parish of Narri, 11 miles southeast of Cobar, show a vein of 1 to 20' width, intermixed with barren streaks, the widest ore shoots being 5 to 10', with best shoot 3' wide and 120' long, carrying chalcopyrite, galena and sphalerite, assaying 1 to 2 oz. silver per long ton, with slaty gangue. The mine has a 713' main shaft, with bottom level at 670' with 500' of drifting. A new orebody of 4' average width and containing 4% copper is reported to have been opened up for over 200' on the 5th level, 1913. The ore carries no gold values and the mine has developed considerable sulphide ore of low average grade.

The smelter has 4 reverberatory furnaces of about 10 tons average daily capacity, and a 12-ton water-jacket blast furnace with a small Connorsville blower. Product is a 40% copper matte. This smelter, with its toy unit, has not given satisfactory results. Ores melted gave an average extraction of 7.75% copper.

Production was 1,104,320 lbs. fine copper in 1907; 1,486,240 lbs. copper in 1908; 8,328 long tons ore mined, and 8,501 tons smelted, yielding 946,720

lbs. copper, secured at a loss, in 1909. Average extraction, last half of 1909, was 5.4% copper. Very little production from 1909 to 1913, but manager writes that company plans erecting concentrating plant to treat the low-grade, silicious ores.

QUEENSLAND COPPER FREEHOLDS, LTD.

QUEENSLAND

Secretary and office: C. D. Comrie, 2 Broad Street Place, London, E. C., Eng. Mine office: Cloncurry, Beaconsfield Co., Queensland, Aus. T. G. Scott, chairman; C. K. Butler, C. H. McEuen and H. Edwards, directors; L'Estrange Nicolson, mgr.; Alex. Hill & Stewart, cons. engrs. Organized Jan. 31, 1907, under laws of Great Britain, capitalization £300,000, shares £1 par; issued £250,000, fully paid. Company holds a third interest in the Mountain Home Copper Co., Ltd.

Owens 8 freeholds, 378 acres, including the Malbon, Dobbyn, Diagonal and Argylla claims, in Cloncurry district, North Queensland, also a third interest in the Mountain Hope Copper Co., Ltd., about 600 acres, and a half interest in a further 40 acres.

The Malbon has been worked by leasers who have extracted about 84 tons of 33% copper ore. No ore of value was found below the 70' level, property resembling the "Duck Creek" mine being an E.-W. quartz lode with rich ore at surface, playing out between 50' and 100'. The Dobbyn is developed by 3 shafts, deepest being 75' showing an orebody averaging 7' wide, 150' long and assaying 20% copper. One hundred and fifty-one tons of 21.8% ore has been recovered and about 4,000 tons raised, averaging 28 to 45% copper. The Argylla is developed by a 100' shaft, showing 26' of ore in a narrow lens of quartz ironstone and kaolin, averaging 6% at bottom level. Diamond drilling to vertical depth of 926' proved 14' of 4% ore, which management might mine profitably with better transportation. The Mt. Hope has been drilled, but without good results and is now under exemption. The Diagonal claim is under lease; developed by 50' shaft producing 17 tons averaging 33% copper.

QUEENSLAND EXPLORATION CO., LTD.

QUEENSLAND

In liquidation, C. Dunlop Comrie, liquidator, 2 Broad St. Place, London, E. C., Eng. Described Vol. X.

QUILOMENCO SMELTER.

CHILE

Owned by Guillermo Echavarría, at Illapel, Coquimbo, Chile.

RAI MINE.

INDIA

Idle. Is an old copper mine in the Kumaon division of the Northwest Province, India, owned 1902, by Himalaya Mining Corporation, now dead. Property shows fissure veins capped by gossan, developed by 80' shaft, whose workings expose 4 small veins of quartz carrying chalcopyrite and bornite with impregnated wall rock. The ore proved too low grade to ship without cheaper railway transportation and mine is now closed down.

RAJDOHA MINE.

INDIA

Also called Rakha Hills mine. Owned by Cape Copper Co. and described under that title.

RAKHA HILLS MINE.

INDIA

Owned by Cape Copper Co. and described under that title.

RAMADILLAS SMELTER.

CHILE

Owned by Francisco Greve G., at Combarbalá, Coquimbo, Chile.

RAMMELSBERG MINE.

GERMANY

Office and mine: Goslar, Harz, Germany. Employs about 650 men. Bergrat Wolff, gen. mgr.; Geh, Bergrat Brauhing, mgr. of copper smelter. Property, owned jointly by the Prussian Crown and the Duchy of Brunswick, is a very ancient mine, worked since A. D. 972.

Lands, 2 miles S. of Goslar, carry 2 lenticular orebodies, of 15 to 50'

width and about 1,300' length each, with known depth of 400 meters, in Devonian slates. The ore is a dense mixture of chalcopyrite, galena, sphalerite and pyrite, with occasional tetrahedrite, gangue being mainly of barium sulphate and calcium-magnesium carbonate. The principal ore produced, called mixed ore, is estimated by the management to average 5 to 6% copper, 8% lead, 22% zinc, 5 oz. silver and 1 dwt. gold per metric ton. Non-zinckiferous copper ore is divided into 3 grades, first averaging 18% copper and 4.85% lead; second averaging 12% copper and 2% lead; third averaging 6% copper and 1.25% lead. The three grades of ore carry from 0.008 to 0.017% silver, and from 0.00011 to 0.00013% gold. All ores are slightly arsenical.

The mine is developed by shafts of 296 and 316 meters depth, and has upwards of 10 miles of workings, being estimated by the present management to have 5,000,000 metric tons of ore blocked out for stoping.

Present production about 32,500 metric tons of copper ore and about the same amount of lead ore averaging 11% pb., 22% zn. and 980 grams silver, annually.

The Okerhütte includes an electrolytic refinery and acid plant, annual capacity of latter being 25,000 metric tons of 50° Beaumé sulphuric acid. The electrolytic refinery has 600 tanks, with multiple arrangement of electrodes. Annual production of the Okerhütte is about 1,700 metric tons of fine copper, in various forms, and about 1,100 metric tons of bluestone. Production was 3,608,930 lbs. electrolytic copper, 1,074 metric tons bluestone, 5,239 metric tons lead, 11,522 kgs. silver and 96.5 kgs. gold, also quantities of various by-products including copperas, zinc sulphate, soda, etc., in 1902; 3,527,360 lbs. copper in 1905, and 3,600,000 lbs. in 1909. Present production is about 65,000 metric tons, annually, half of which are lead ores. The mine and works are managed with technical skill and success.

Equipment includes 2 hoists, good for 350 meters each, and a 30-drill air compressor, with necessary buildings. There is no mill, ores going direct to the smelter, after a limited amount of hand dressing.

The copper smelter, known as the Okerhütte, at Oker, is of 300 tons daily capacity, while lead ores are reduced at other works, known as the Juliushütte and Sophienhütte. The Okerhütte has 20 kilns and ovens for calcining, twelve 25-ton blast furnaces and five 15-ton reverberatory furnaces. The first-fusion product is a matte of 35 to 40% copper tenor, carrying 3 to 4% lead from the mixed ores treated, and this matte is roasted and resmelted. The Oker works produce also considerable speiss carrying about 51% copper, 35% lead, 1.8% zinc and 0.175% combined gold and silver, with traces of nickel and cobalt, also iron, arsenic, bismuth, antimony and sulphur. The finished products of the Okerhütte are blister copper and anodes.

RAMOS i RAMOS; JOSÉ TOMAS.

CHILE

Office and mine: Chalinga, Illapel, Coquimbo, Chile. Property is the Llamaco mine, showing large orebodies of 4 to 7% average copper tenor, well adapted to concentration. Property includes a small smelter. Production at last report, 155 metric tons of 22% ore, secured with 14 workmen. With rail communication and a modern reduction plant the property could be made a considerable producer.

RANDFONTEIN EXTENSIONS, LTD.

TRANSVAAL

Secretary and offices: E. A. Schneidau, Throgmorton House, Copthall Ave., London, E. C., Eng. Local office: 68 Commissioner St., Johannesburg, Transvaal, S. A. Hon H. A. Stanhope, chairman; F. Tripcomy and R. H. King, directors; G. E. Regis, mine mgr. Organized Oct., 1895, cap-

italization £200,000, shares £1 par; issued, 172,140. Accounts for year ending July, 1912, showed cash £2,145.

Company owns 95 copper mining claims in the Rustenburg district, as well as many gold and other claims. Management expects to dispose of its copper properties to a new corporation as the prospecting work thus far done has been promising.

RANEN COPPER CO., LTD.

NORWAY

Office: 24 Martins Lane, Cannon St., London, E. C., Eng. Sir. H. C. King, Col. C. F. Grantham, H. D. F. Baselow and A. Nichols, directors. Organized Jan. 24, 1913, capitalization £100,000, shares 10s. par. Is a reconstruction of the Holmholmen and Plurdalen copper companies.

RETIA MINING, POWER & RAILWAY CO., LTD.

AUSTRIA

Secretary and offices: E. T. Evans, 18 Ropemaker St., London, E. C., Eng. L. T. Held, W. Gosling and E. T. Evans, directors. Organized Nov. 1911, capitalization £300,000, shares £1 par; issued, 140,007. Property consists of the lands of the Kupfergewerkschaft Predazza Oss Matzurana, the silver-lead mines of the Gewerkschaft Toesens and Mons Argentarius Societa, in the Clara and Giulio mining districts, Austrian Tyrol.

RHOAB MINES OF RHODESIA, LTD.

RHODESIA

Secretary and office: G. E. C. Clark, 85 Gresham St., London, E. C., Eng. Mines in Rhodesia, South Africa. Hon. J. G. Jenkins, T. S. Horn, E. H. R. Trenow, directors. Organized April, 1911, capitalization £100,000, shares 10s. par; issued, 100,007, fully paid and 7 having 6d. paid.

Property consists of 20 claims, in 2 groups known as the Calcite and Calcite Extension in the Bubi district; 40 claims known as the West Glen Mav and the Sulphate, in the Bulawayo district and 30 claims known as the Zero and Carbonate in the Gwanda district.

RHODESIA CONSOLIDATED, LTD.

RHODESIA

Secretary and offices: Gold Fields Rhodesian Development Co., Ltd., 8 Old Jewry, London, E. C., Eng. Mines in Rhodesia, S. A. Major F. Johnson, chairman; W. F. Andrewes, R. G. Fricker, H. P. Clemes, W. Rhodes, J. P., Capt. Hon. C. J. White, directors. Organized in Rhodesia July, 1909, as a reconstruction of company of same name organized 1903; capitalization £700,000, increased Dec., 1910, from £550,000; shares 10s. par; issued and fully paid, 1,194,675. Shareholders were offered 1 share credited as 7s. 6d. paid for every old fully paid share held. Accounts for the 18 months ending March 31, 1913; showed loss of £10,099, reducing balance to £26,605.

Property includes over 600 claims in the East Rand and mining property in all parts of Rhodesia, also large interests in the Falcon Mines, In-siza Mines, Asp Gold, Sabi Gold, Rhodesia Mines Trust, etc., and the Headlands copper properties, N. E. of Salisbury, which are being developed. A number of mining claims were abandoned on the advice of its engineers in 1913.

RHODESIA COP. & GEN. EXPL. & FINANCE CO. LTD. RHODESIA

Secretary and office: T. Donald, 365 Salisbury House, London, E. C., Eng. Operating office: Bulawayo, Rhodesia. Mine office: Bwana M'Kubwa, Northwestern Rhodesia, S. A. Edmund Davis, chairman; Lieut.-Col. C. H. Villiers, P. Coventry Tarbutt, Herbert L. Stokes, J. E. H. Lomas and Dr. F. R. Harris, directors; W. G. Sheffield, metallurgist; Bechuanaland Exploration Co., Ltd., mgr. Organized Jan. 31, 1902, under laws of Great Britain, as Rhodesia Copper Co., Ltd., and title changed July, 1911. Capitalization £562,500, shares 7s. 6d. par; issued, 1,167,101 shares, fully paid. Shareholders were given new stock of 7s. 6d. par in exchange for old stock of £1 par, fully paid. The company owns about 400,000 fully paid shares in the Rhodesia Broken Hill Development Co., Ltd.; Kafue Copper De-

velopment Co., Ltd., and Bwana M'Kubwa Copper Mining Co., Ltd., controlling the latter through ownership of £146,250 stock, and holding large share interests in the other companies named. This company owns 12,500 "B" shares and £50,000 debentures of the Rhodesia-Katanga Junction Railway & Mineral Co., Ltd., and has a close working alliance with the Northern Copper (B. S. A.) Co., Ltd.

A dividend of 5% was paid in Aug., 1910. Accounts for year ending May, 1912, showed £558 loss, but for 1913, the profit was £5,027 which, added to previous credit balance, gives a total of £15,249 as of May 31, 1913.

In Sept., 1913, it was proposed to distribute the company's large stock holdings of subsidiary corporations among the shareholders. To accomplish this legally, it is planned that the capital of the company be reduced from £562,500 to £352,793 2s., and that such reduction be effected (a) by distributing in redemption of capital among the holders of the 1,172,512 shares (numbered 1 to 1,172,512 inclusive,) which have been issued, rateably in proportion to the shares held by them: 293,128 fully-paid shares of 10s. each of the Bwana M'Kubwa Copper Mining Co., Ltd; 53,296 fully paid shares of 5s. each of the Rhodesia Broken Hill Development Co., Ltd.; 53,296 fully-paid shares of £1 each of the Kafue Copper Development Co., Ltd., and £14-656 8s. in cash, but so that shares which, but for this provision, would be distributable in fractions, shall be sold by the company, and the net purchase money substituted for the fractions, and (b) by reducing the nominal amount of each of the shares in the company's capital, numbered 1 to 1,398,046 inclusive, from 7s. 6d. to 4s. 6d.

Lands are 640 sq. miles, or 409,600 acres, carrying both mineral and surface rights, within the bend of the Kafue river, including the Lishambeka, Wonder Rocks, Tungi, Eland, Kabulansuki and Kamiyobo mines. Company also owns a considerable number of farms, aggregating 126,000 acres; 1,140 mining claims; a three-fourths interest in 220 additional claims in northern Rhodesia, and the right to locate 4,020 further claims.

RHODESIA-KATANGA JC. RY. & MINERAL CO., LTD. RHODESIA

Secretary and office: L. Scotland, Friars House, New Broad St., London, E. C., Eng. Mine office: Kansanshi, Rhodesia, So. Africa. T. White, J. P., chairman; Robert Williams, managing director; J. H. Birchenough, C. M. G., M. White, C. F. Rowssell and G. Pauling, directors. Organized Jan. 25, 1909, under laws of Great Britain, capitalization £1,510,000, in £1-, 500,000 ordinary shares of £1 par, and 200,000 "B" shares of 1s. par; issued, £593,757 ordinary shares, and £187,650 "B" shares, fully paid. Debentures, £800,000 of 5½%, guaranteed by the Tanganyika Concessions, Ltd., convertible into shares at par, on or before Jan. 1, 1914; issued, £653,000. Company is a subsidiary of the Tanganyika Concessions, Ltd., and its property, the Kansanshi mine, is described under that title.

RHODESIA-KATANGA JC. RY. & MINERAL CO., LTD. RHODESIA

Secretary and offices: T. A. Henningsen, Dashwood House, London, E. C., Eng. Mines and lands in Rhodesia, So. Africa. J. Eustace, chairman, and P. Sanders, directors. Organized Dec., 1895, as successor of the Joint Stock Companies Agency, capitalization £250,000, shares £1 par; issued, 77,906, fully paid. Owns 8,600 acres farm land and shares in Copper Fields of Namaqua, New Rhodesia Mines, Ltd., and many other mining companies in Rhodesia.

RIBILLO; JUAN DE C.

CHILE

Mine office: Carrizalillo, Chañaral, Antofagasta, Chile. Property is the Yotesito mine, which produced 850 metric tons of ore annually averaging 15% copper, equivalent to about 275,000 lbs. fine copper, at last accounts.

RICA MINA (BAJO RIO TINTO); SOC. MIN. LA.

SPAIN

Mine near Berrocal, Huelva, Spain. Prince Pignatelli de Aragon, P. Duthie de la Tuque, A. Barthez, F. Fernandez and E. Wisse, directors. Organized Jan. 1, 1907, in Spain, capitalization 1,250,000 pesetas, 5 pesetas par. Owns the Rica mine. Idle.

RICHELSDORF I; KUPFERERZBERGWERK.

GERMANY

Mine office: Nentershausen, Hessen-Nassau, Germany. E. J. Enners, J. W. Piepmeyer, Otto Vetter, C. Julius Winter and A. Sternberg, directors. Has 1,000 shares. Lands, on Richelsdorfer mountain, are the Richelsdorfer and Karl-Alexander mines, showing cobalt and nickel ores, partially developed. No recent returns secured.

RIETFontein (T. C. L.), LTD.

TRANSVAAL

Office: Corner House, Box 4303, Johannesburg, Transvaal. G. C. Dammant, mgr.; B. I. Campbell, resident sub-mgr. This is a gold mining company, whose ores contain a little copper, enough to be troublesome in treatment, but not enough to treat for copper. Mine may possibly develop copper ore in commercial quantities with deeper workings.

RIO BLANCO SMELTER.

PERU

Owned by Peruvian Mining, Smelting & Refining Co.

RIO FARDÈS; SOC. ANON. DES MINES DE CUIVRE ET DE PLOMB ARGENT DU.

SPAIN

Probably idle. Office: 3 Place Royale, Brussels, Belgium. Mine office: Molinillos, Ciudad Real, Spain. August Dupont, E. Roth le Gentil, J. B. Cesari and R. Dufour, directors; H. M. Scherb, mgr. Organized July 1, 1903, under laws of Belgium, capitalization f2,500,000, shares f250 par, as successor of Société Anonyme des Mines de Cuivre et de Plomb Argentifère du Rio Fardès ci-devant Mines de Molinillo (Espagne). Annual meeting, first Monday in May. Lands, near Molinillos, carry silver-lead and copper ores.

RIO MURTIGA; SOCIÉTÉ DES MINES DU.

SPAIN

Mine at Encinasola, Huelva, Spain. Organized Jan. 7, 1904, under laws of France, capitalization f57,500, shares f250 par. The first company of this name was dissolved April 28, 1896. Owns the Santo Domingo and Santa Isabel mines. No returns secured.

RIO TAMBO, LTD.

PERU

Formerly at Poseo, Islay, Arequipa, Peru. Liquidated voluntarily, June, 1911.

RIO TINTO CO., LTD.

SPAIN

Secretary and offices: 3 Lombard St., London, E. C., Eng. Mine at Rio Tinto, Huelva, Spain. Works office: Port Talbot, South Wales. Chas. Wm. Fielding, chairman, Rt. Hon. Earl of Denbigh, Viscount Milner, P. C., G. C. B., G. C. M. G., John MacFarlan and John M. Macdonald, directors; Turquand, Youngs & Co., auditors; Walter J. Browning, mine mgr.; R. E. Palmer, asst. mgr.; G. W. Porteous, traffic, mgr.; Gordon Douglas, engr.; J. Angus, cons. engr.

Organized March 29, 1873, under laws of Great Britain, capitalization £3,500,000, increased, Nov., 1905, from £3,250,000, shares £5 par, in £1-, 625,000 cumulative 5% preference shares and £1,875,000 ordinary shares, fully issued and paid. The new issue of 50,000 ordinary shares, par £5, was sold to sharerolders at £63 per share, netting the company £3,150,000, for the redemption of an outstanding bond issue of £2,989,740, at 4%, which was fully retired. Transfer form, common; fee, 2s. 6d.; warrants to bearer are issued in denominations of 1 share, fee 6d., and 5, 10 and 25 shares, fee 1s.; fee for conversion into registered shares, 2s. 6d. per certificate. Stock Exchange settlement; all shares quoted in the official list. Fiscal year ends with the calendar year; accounts are issued in April, and an interim semi-

yearly report is issued in October. Dividends are payable in Paris by the Société Générale, 54 Rue de Provence.

Accounts for 1912 showed a gross profit on sales of £2,274,900 compared with £1,349,500 in 1911 and a net profit of £1,935,000 compared with £1,067,000 in 1911. Dividend was 90% in 1912 compared with 52½% the year previous and balance carried forward £194,600 compared with £28,300 in 1911.

Dividends were begun 1879, and have been paid continuously, varying greatly, according to net earnings. Dividends on the old ordinary shares, of £10 par, 1879 to 1896, ranged from 6s. in 1886 to 38s. in 1896. On the present ordinary shares of £5 par, dividends have ranged from 40% in 1897 to 110% in 1906. Dividends were small at first, because the company was seriously handicapped by 3 different sets of mortgage bonds, bearing 5% interest. In 1895 the mortgage debt was consolidated into a single issue of £3,600,000 first-mortgage debentures, bearing 4% interest, with a sinking fund and semi-annual redemption, which would have extinguished the mortgage in 1919, but, by the issue of new share capital, Nov., 1905, floated at the tremendous premium of 1,160%, the company placed itself in an impregnable financial position, the credit for this able stroke of finance having been due mainly to Mr. Fielding. Recent dividends on ordinary shares have been as follows: £3 12s. 6d., or 72½%, for 1901; £2 10s. or 50%, for 1902; £3 10s., or 70%, for 1903; £3 10s., or 70%, for 1904; £4, or 80%, for 1905; £5 10s., or 110%, for 1906; £4 7s. 6d., or 87½%, for 1907; £2 15s., or 55%, for 1908; £3, or 60%, for 1909, with an interim dividend of £2 10s. for 1910; £2 12s. 6d., for 1911; £4 10s., in 1912 and an interim dividend of 2s. 6d on preference and 40s. on ordinary shares in 1913. The company's dividends in 1912 were the greatest ever paid in 1 year by any copper mine. The company has a reserve fund of £500,000, of which £400,000 are invested in consols, and £100,000 are in choice selected shares. Gross income was £1,250,112, with expenses and losses of £232,127, in 1910.

Lands, 23,000 acres, freehold, of which 4,700 acres, were secured from the Spanish government, and 18,300 acres adjoining were purchased from private owners. Mining operations are conducted in an area of practically 5 sq. miles.

The Rio Tinto is the Methuselah of all known mines. The first semi-authentic account of the mines dates from the eleventh century before Christ, when the Phœnicians traded in copper made from its ores. Carthage, that vigorous young offspring of Tyre, succeeded to the hegemony of the Iberian mines, and worked the Rio Tinto mines extensively, for several centuries, being displaced, in turn, by the Romans, after the repulse of the second Punic invasion, and the total overthrow of the Carthaginian power. The Rio Tinto was worked by the Romans, for centuries upon a very considerable scale, and after the decadence of the Roman power the mines were operated in a very crude way by the Goths. Again the fortunes of war gave the Iberian peninsula to new masters and the Moors in turn were owners and operators of this great copper deposit. Following the expulsion of the Moors from southern Spain by Ferdinand and Isabella the mines fell into the hands of the Spanish and were reopened by them very early in the sixteenth century. The Spaniards, while among the world's best miners, and the pioneers of silver and gold mining in both North and South America, never paid close attention to copper or iron, and, even at home the Rio Tinto, although the property of the Spanish Crown, was worked, during its most successful periods, by foreigners, as it is to this day.

In the seventeenth century the mine became a considerable producer, under the management of a Swedish engineer named Wolters, and after his

death did fairly well under the direction of a French metallurgist named Tiquet. In the eighteenth century the mine was leased from the crown by a company of English adventurers, of whom the leading spirit was Lady Maria Theresa Herbert. During the chaotic period of the French invasion, early in the nineteenth century, the mine was abandoned, and, after being reopened, 1812, by the Spanish Crown, was worked in a small way only. For the next 60 years the mine was under the management of various lessees, until sold outright in 1873, to Matheson & Co., of London, for 92,800,000 pesetas, that firm organizing the present company, which has proven one of the most profitable mining corporations in existence.

The relics of the mining and smelting operations of the ancients are large, numerous and remarkable. The late Don Gonzalo Tarin, who was consulting engineer of the company and was closely connected with the mine for 40 years, beginning 1867, in his very able work, "Memorias," estimated the quantity of scoria remaining from ancient smelting operations, whether Roman or Phœnician, or both, at no less than thirty million metric tons, and his acquaintance with the property and its history and his opportunities of estimating and verifying these figures were perhaps better than those of any other man. Lying above slag piles left by the Phœnicians is a 10' bed of alluvium, on top of which are the Carthago-Roman slags. The smelting practice of the Romans apparently was very good, the slags left by them being as clean as those produced today. It is possible, however, that some of the copper left in the old slags has been leached out, during some 2,000 years of partial exposure to the elements, but it is the opinion of Señor Tarin that the slags were resmelted, in which case the latest modern metallurgical practice is but a repetition of the methods employed around the beginning of the Christian era.

The only remains of ancient mining tools and machinery that have been found at the Rio Tinto are 3 oak water-wheels, an oak ladder and some oak pitwork, with several bronze rims of kibbles, which presumably were of wickerwork. The iron tools undoubtedly have turned to rust in 2 millenniums, oak proving more enduring than iron. There also are many potsherds, including fragments of miners' lamps of the well-known classic pattern, and Roman coins are unearthed occasionally.

The Roman system of mining, so far as can be judged from the evidence offered by the Rio Tinto, was to cut narrow seams and slab off the ore in large masses, either by wedging or by the agency of quicklime tamped into the crevices and then wetted, and possibly both methods were used, these being the systems most generally employed previous to the adoption of gunpowder for blasting. The richer veins were followed persistently and the ancients were good judges of values, as has been learned by many a modern mining company that has reopened ore mines in Spain and Italy, in the hope of finding that much high-grade ore was left unmined. The Rio Tinto was not worked out because the deposit was too vast, but the rich ores of the secondary zone of enrichment were quite effectually extracted in all the old workings.

The Rio Tinto is situated in a rugged district, in a spur of the Sierra Andevallo, though the hills sometimes are held to be a spur of the Sierra Aracena, which itself is a branch of the famous Sierra Morena. The Rio Tinto, however, is separated from the Sierra Andevallo, which is some 12 miles distant, by the rivers Odiel and Járrama, and the mines are 51 miles by rail from the seaport of Huelva, in the province of that name, lying in the extreme southwestern corner of Spain, near the Portuguese boundary.

The orebodies of the Rio Tinto occur in mammoth lenses, with clay-slate on the S. and porphyry to the N., and are surmounted by large masses

of iron-ore gossan. The deposit has been leached to a depth of 100' where the zone of secondary enrichment begins, continuing to an average depth of 300'. Diamond-drill borings have shown untouched orebodies carrying upwards of 130,000,000 long tons of ore, giving sufficient reserves for about 60 years' production, and it is unlikely that the full extent of the orebodies available has been proven. The ore is of 2 classes, by far the larger part being slightly cupriferous pyrite, used largely in the manufacture of sulphuric acid, the second class consisting of copper sulphides disseminated in a silicified porphyry gangue. For removal of overburden there are 14 steam shovels, the largest having dippers of 4 cu. yds. capacity, and about 2,000,000 cu. meters of overburden is removed yearly, though this figure has been considerably exceeded in some years under exceptional requirements.

The ore produced is graded in 3 classes: (1) smelting ore carrying 4 to 6% copper; (2) export ore about 3.5% copper, and 45 to 50% sulphur; (3) leaching ore has 1.5 to 2% copper only. The average amount of copper contained in the ores treated has ranged from 1.5% copper, in 1876, the first year of production by the present company, to 3.234% in 1884. The output of the mine for 1912 was 2,406,969 tons carrying 2.18% copper. Tonnage has gradually increased for the last 5 years but the copper content has varied and is now higher than it has been for 2 years past. The ores carry an average of 1.5 oz. silver per long ton, with traces of gold, and considerable silver is saved, by the Claudet process, at the smelter. About one-third of the total production is exported for sulphur contents, about one-third smelted, and the balance either leached or sent abroad. The ores average 4 to 5% copper in the zone of secondary enrichment, and with depth decline gradually in value, until at about 1,000' depth the average copper tenor is only about 1.25%. The main orebody is cupriferous pyrite, carrying copper in the form of minute grains of chalcocite and chalcopyrite. Owing to the ore being unusually rich in sulphur the shipping ores of the Rio Tinto are in good demand, and in addition to supplying various British works the company exports washed sulphur ore in very large quantities to Germany, France, Belgium and a number of acid works in the United States. The reserve heaps at the mine are estimated to carry about 150,000 long tons fine copper.

The Rio Tinto has 3 mineral zones, carrying a succession of lenses, these being known as the South or Nerva lode, the San Dionisio or Middle lode and the North lode, in addition to which there are 2 smaller detached lenses adjacent to the North lode, which also are being worked opencast. There are 5 different mines, of which 4 are worked opencast and 1 underground. The underground mine is worked pillar-and-stall, with levels at intervals of 12½ meters, levels being opened 4 meters high and the entire floor divided into galleries and crosscuts of 4x4 meters, leaving pillars of 6x6 meters, which is not an entirely satisfactory method of extraction, leaving as it does more ore in the pillars than is mined.

The San Dionisio mine, the westernmost and deepest of the group, has a shaft of nearly 1,200' depth. The work of changing over the San Dionisio for opencast extraction was begun 1907, and completed 1911. The overburden, consisting principally of porphyry and slate, was removed by steam shovels and carried through tunnels on the different levels, similar work being done on the South Lode opencast extension. Ore will be mined by steam shovels to as great a depth as practicable, below which it will be necessary to hoist by shafts to the lowest tunnel level. The San Dionisio is likely to be the chief source of ore supply for several decades to come and work has been planned systematically for 10 years in advance.

Most of the ore mined is hauled out through tunnels without the need

of shafts or engines. The lowest tunnel now in use for the 2 main lodes, the South and Dionisio, has not proven deep enough and management plans driving a new tunnel, 200' below the present one, which will be 3 miles long, and will require 3 to 4 years for completion.

Wherever possible mining has been done by openpit workings which have the great advantage of giving complete extraction of the ore, and also are more economical in tonnage costs in the long run, though requiring enormous initial expenditures for the removal of overburden. Fortunately, the financial resources of the company permit the outlay of vast sums, the principal of which will not be repaid for many years but which eventually will be returned in full with very handsome interest. The possibility of using the caving system for underground mining was considered, but an adverse decision was reached. Timber is scarce and high priced. The depth of the largest pit is about 600' and beyond the great pit the immense orebodies are worked by drift-stopes, the capping being blasted and sent down the shafts to fill and hold the ground as the ore is removed. Steam shovels recently have replaced manual labor to a considerable extent in opencast ore extraction.

A central electric power plant, installed 1908, replaced a number of uneconomical steam installations. The mining equipment is adequate, but owing to extraction being mainly opencast the Rio Tinto lacks the powerful and spectacular mining machinery found at many other great copper properties, through no lack of enterprise, but owing to the company's fortunate position in requiring the minimum of such costly machinery.

Below the main pit are the roast yards, leaching bed, precipitation plant and smelter. The methods of leaching are described at length in the chapter on hydrometallurgy, in this volume. The average rainfall of the Sierra Morena, 1873-1905, was 28" yearly, but there are protracted seasons of drought, alternating occasionally with heavy rainfalls, hence extensive water storage is necessary, and there are large dams for this purpose, the last having been built 1907. The ore leached is no longer calcined, the copper becoming soluble by natural weathering, assisted by systematic sprinkling. About 7,000,000 gal. of leach-water, strongly charged with copper sulphate, are treated daily in the various lixiviation plants, yielding cascara, or copper precipitate.

The smelter, at the mine, built 1902, with American equipment throughout, treats a large proportion of ore on the ground, including considerable ore of a grade formerly leached. The smelter has two 42x160" elliptical water-jacket cupolas, 23' 4" over all in height, with charging doors 10' above the bottoms, which are detachable and mounted on wheels. Each furnace has 8 water jackets and 2 charging doors, ore and fuel being charged alternately. The furnaces have continuous discharge into 30-ton settlers, 12' in diameter and 40" high, which have continuous slag discharge. Furnace product is low-grade matte, of 29 to 34% copper tenor, taken in 8-ton ladles by electric traveling cranes to the converter department, where there are 6 stands, rotated hydraulically from a pulpit. Shells, 80x120", of horizontal barrel type, with spherical valves and 12 tuyeres each, are in 2 parts for convenience in lining, and are double-lined with a 4" external course of fire brick, rarely replaced, and an inner section, 22 to 26" thick, of ground silica and low-grade quartzose copper ores, with 10% of clay for a binder. When newly lined the shells have a capacity of only 3 to 4 tons each, increasing to about 8 tons when the inner linings are nearly burned out. The smelter product is converter bars, of 98 to 99% copper tenor.

There are 5 towns for employes built on the property of the Rio Tinto, and a large number of new dwellings were erected, 1909-10, to replace those

destroyed, early 1908, by subsidence of the workings of the South Lode.

The Rio Tinto employs about 15,000 men, in Spain, of which about 60 are British, earning average wages of 15 reals, equal to about 60 cts. per day of 8 and 9 hours. There is no Sunday work, and the men are paid daily. The population of the dual mining township of Rio Tinto-Nerva is about 30,000, and that of the port of Huelva, 25,000, hence it is estimated that the Rio Tinto Co., Ltd., is the direct source of support of 50,000 people in Spain and indirectly supports perhaps half as many more in Spain, England, and upon the Continent.

In Oct., 1913, 21,000 miners went on strike which only lasted a month so that the output was not seriously curtailed.

The mines are connected with the seaport of Huelva by the Rio Tinto-Huelva railway, a single-gauge line of 87 kilometers length, built 1873, by the company and slightly lengthened, 1908. This line does a general freight and passenger business, in addition to handling the company's heavy traffic. Huelva is built on the site of the old Phœnician city of Onoba, at the junction of the Tinto and Odiel rivers, known to the Phœnicians and Carthaginians as the Urium and Anas. The company has extensive railway terminals and wharves at the city and maintains a steamer service between this point and Wales.

The Welsh reduction plant, at Port Talbot, South Wales, is a modern smelter of good design and equipment, receiving material by sea from Spain, and having direct rail connection with the Great Western railway. Electric power is used throughout and there are 2 Temperley electric transporters for carrying bags of precipitate and bars into the ore sheds. The Port Talbot works have five 30-ton refining furnaces, top-charged by cars operated electrically with side-slag discharge. Slags from the reverberatories, carrying 4 to 6% copper, are resmelted in a water-jacket blast furnace. The cinder from the acid plant is treated by the Henderson wet process for the extraction of copper.

Production, 1876-1910, was 16,569,238 tons of pyrites shipped, and 33,190,235 tons of ore treated locally, a total of very nearly 50,000,000 long tons, this ore yielding 599,152 long tons fine copper. Copper produced at the mines amounted to 54,575,370 lbs. in 1909, and 51,049,600 lbs. in 1910. Production has been very regular, since 1891, with a minimum of 19,530 long tons in 1905, and a maximum of 24,364 long tons in 1909. Ore mined 1910 was 2,146,765 long tons, of which 637,020 tons were shipped direct, and 1,509,745 tons were reserved for local treatment, deliveries to customers amounting to 683,605 tons of sulphur ore and 578,443 tons of cupreous ore. The maximum copper production of the Rio Tinto was 80,214,400 lbs. in 1904, and recent production was 78,333,280 lbs. in 1909; 74,867,320 lbs. copper in 1910; 74,782,400 lbs. in 1911 and 89,432,000 lbs in 1912. Total copper produced since 1876 when company began business is 2,276,348,480 lbs.

The company has been co-operating with the leading American producers since 1910, in a policy of slight curtailment, of the supply of copper. Average cost formerly about 7 cts. per lb. now is only 6 cts. per lb. of finished copper, after deducting revenues from sulphur sold and miscellaneous sources. The management of the company is first rate both technically and financially, and the mine itself, after 3,000 years of production, requires no commendation.

RIPARBELLA, LTD.

ITALY

Office: 62 London Wall, London, E. C., Eng. Mine office: Riparbella, Tuscany, Italy. Lord Teynham, chairman; Sir T. D. Pile, Bart., Marquis O. B. di Castell-Bianco and F. D. de Mallortie, directors; G. T. Broadbridge, sec. Organized Dec. 31, 1907, under laws of Great Britain, as South Italy

Copper Mines, Ltd., and name changed, March, 1909, to present title, capitalization £300,000, shares £1 par; issued, £150,507, fully paid. Lands, 140 hectares in the Commune of Riparbella, Tuscany, acquired from M. Stephinger, in 1907. No record of operations secured.

ROBIN HOOD MINE.

QUEENSLAND

Situated in the Herberton gold and mineral field, Queensland. Flanagan Bros., owners. Developed by 60' shaft and 55' and 100' tunnels. Owners shipped about 100 tons of ore averaging 11 to 26% copper to the Chillagoe smelters, 1912.

ROEBOURNE COP. & GOLD MINES, W. A., N. L. W. AUSTRALIA

Office: Sydney, N. S. W., Aus. Mine office: Roebourne, Western Australia. Organized Jan., 1907, capitalization £40,000, shares 10s. par. Lands are the Carlow Castle group, leasehold, carrying 2 orebodies, said to show considerable gold and copper ore. No recent returns secured.

ROEBOURNE COPPER MINES, LTD. WESTERN AUSTRALIA

Secretary and offices: Henry Bacon, 62 London Wall, London, E. C., Eng. Mine near Roebourne, Western Australia, Douglas J. Neame, D. J. Paterson and E. Ronaldson, directors. Organized 1913, capitalization £150,000, shares £1 par; issued, 127,000.

Property, 4 leases, known as the Good Fortune, Good Hope, Fortune No. 1 and Fortune No. 2, 96 acres, 6 miles from Roebourne, the administrative center of West Pilbara district.

Claims show gabbro traversed by a schistose belt, or zone, containing green carbonates of copper and iron oxide. Property has been developed by numerous shafts showing 6 to 14' of ore. It is estimated that there are over 700 tons of 5½% ore opened along the outcrop; the average value of the ore now mined is 10% copper. The C shaft, 53' deep in Jan., 1913, showed an orebody 41' wide for a length of 130', averaging 8½% copper. Shipments to European smelters have returned from 22.92 to 30% copper, 5.447 oz. silver and 0.036 oz. gold.

Management plans sinking a shaft below water level to reach the primary ore and blocking out reserves of enriched ore. Property reported on by H. R. Sleeman, manager of the Whim Well Copper Mines, Ltd., who regards mine as a promising prospect.

ROGERS FREEHOLD COPPER MINES, LTD.

QUEENSLAND

Mine at Mt. Orange, near Mackay, Queensland, Aus. Organized Aug., 1907, in Queensland, capitalization £65,000, shares 10s. par. Controlled by J. Rogers, of Croydon, who bought mine for £2,000 and shares in the company. Claims comprise 200 acres on which development work was started July, 1912.

ROJAS; RAFAEL.

CHILE

Office and mine: Tres Puntas, Tocopilla, Antofagasta, Chile. Property includes Tres Puntas mines, showing a vein traceable 140 meters and opened to depth of 100 meters. Production about 200 metric tons of 17% copper ore per year, at last accounts.

ROMANERA COPPER CO., LTD.

SPAIN

Idle. Secretary and office: E. Ells, 37, Lime St., London, E. C., Eng. Mine office: Paimogo, Huelva, Spain. Geo. B. Mee, chairman and W. A. Stearns, J. P., directors. Organized Sept. 3, 1908, under laws of Great Britain, capitalization £110,000, shares 5s. par; fully issued and fully paid. This company was practically a reconstruction of the Anglo-Spanish Copper Co., Ltd., which was liquidated, 1910, compulsorily, and which in turn was practically the successor of the Spanish Copper Co., Ltd.

Lands, 16 claims, 440 acres, perpetual leasehold. Accounts for year ending Oct. 31, 1911, showed cash £10, debtors £605 and creditors £2,147,

which seems unpromising. Property was to be taken over by the Société de Saint Gobain Channy et Arey, a well known French company, in 1913, and is described under that title.

ROOIPUTS COPPER CO.

CAPE PROVINCE

Office: Bains Bldg., Johannesburg, Transvaal. Mine office: Upington, Gordonia, Cape Province. Chas. A. O. Bain, chairman; G. H. Poole, Gustav Sonn and W. J. Holmes, directors; H. Sothcott, sec. Organized Aug., 1908, under laws of Transvaal, capitalization £6,000.

Owms mining rights to the Farm Rooiputs, 13,400 morgen, equivalent to 25,000 acres, adjoining the Areachap property on the N., held under option from June 30, 1908, at £1 per month for first year, and £3 per month for second year, with right to remove all ore at 2s. 6d. per ton, during term of the option, and privilege of purchasing the mineral rights on the Farm Rooiputs for £10,000 and 500 shares in any company floated. Diamonds are said to have been discovered on the farm, and it is supposed to carry the extension of the Areachap orebodies.

RÖROS KOBBERVERK.

NORWAY

Office: Trondhjem, Norway. Mine office: Røros, Norway. Organized 1644, reorganized 1910 as a limited company, 2,064 shares, 600 kroner par. Nearest rail point is Harborg on the Røros line. Property, is a group of old mines including the Storvarts, Kongens, Kvintus, Sextus and Muggruben and is now the second largest copper producer in Norway. Dividend for 1912 was 6%.

The ore of the mines is cupriferous pyrite, ranging from 4 to 6% copper in the Kongens group, about 4% copper in the Muggruben and from 4 to 12% copper in the Storvarts mine, the pyritic ores averaging about 43% in sulphur.

Equipment includes an hydraulic power installation with electrical power transfer to all the mines. There are aerial ropeways of 2, 4½ and 9 kilometers from the mines. The smelter has water-jacket blast furnaces, giving a first fusion product of 37% copper tenor, which is blown up in Bessemer converters to black copper of 95.5% tenor, which is refined in reverberatory furnaces.

Production, 1,644 to 1,912 was 82,695 metric tons fine copper and 433,000 tons sulphur pyrites exported, having an aggregate value of upwards of \$35,000,000. Recent production has been 1,303,680 lbs. fine copper in 1898, 1,641,920 lbs. in 1904, 1,365,000 lbs. in 1907, about 10,000 metric tons of sulphide ore exported and 17,000 metric tons copper ore smelted, yielding about 1,800,000 lbs. fine copper in 1909; 12,700 metric tons of pyrites exported and about 15,000 tons copper ore smelted, yielding 1,300,000 lbs. fine copper in 1912.

ROSA HERMINIA MINE.

BOLIVIA

Situated in Canton Caquiaviri, Province of Pacajes, Bolivia. This mine was the only one active in the district during 1912. The workings, as yet shallow, develop a small vein of ore yielding a product carrying 35% copper when sorted.

ROSARIO; MINA.

CHILE

Mine office: Tamaya, Ovalle, Coquimbo, Chile. Is owned by the Familia Lecaros. Mine, opened 1850, is 590 meters in depth and produced, 1866-88, ore to the extent of 64,589 short tons, averaging 17.7 to 29.4% copper tenor. Idle some years, owing to decreased ore values at depth, and heavy timbering charges, but, with a railroad to Tongoi and modern equipment, can probably be worked to advantage.

ROSARIO; COMPAÑIA MINERA.

ARGENTINA

Idle. Mine at Calamuchita, Cordoba, Argentina. The mine has pyrite,

carrying chalcopyrite, with quartz gangue, averaging 5 to 6% copper. Has a smelter with a 36" blast furnace that made matte averaging 65% copper and 30 oz. silver per ton, sent to Great Britain for reduction and refining.

ROSARIO i PROVIDENCIA; MINAS.

CHILE

Mine near Chafarcillito, Atacama, Chile, shows 2 parallel orebodies, averaging 8 to 10 meters width, in diorite and limestone, traceable for some distance, 1 showing oxidized ores of copper, associated with spathic iron, these averaging about 4% in tenor and requiring concentration. The second vein carries only oxidized ores, to depth opened, averaging about 5% copper. Ores are free smelting and are sent to Tierra Amarilla for reduction. Production was about 450 metric tons of ore, averaging 16%, equivalent to about 160,000 lbs. fine copper, yearly, at last accounts.

RÖSTVANGEN GRUBER; AKTIESELSKABET.

NORWAY

Office: Christiania, Norway. Mine office: Kvikneskogen, Røros, Trondhjem, Norway. Joh. Didrichsen, chairman; N. Persson, vice-chairman; J. Chr. Bisgaard, sec.; preceding officers, Kr. Johanssen, L. Bjønness, and Fr. Langaard, directors; Carl Dahlberg, gen. mgr.; B. Bredesen, mill supt. Organized May 18, 1908, under laws of Norway, capitalization 1,000,000 kroner, fully paid. Annual meeting, last of March.

Lands, 170 claims, showing mica-schists and gabbro, carrying 9 orebodies, with N.-S. strike, between mica and amphibolite schists. There are 2 veins under development, of 4 to 14 meters estimated average width. These veins carry pyrite and chalcopyrite ore estimated by the management to average 2.5 to 4% copper and 46% sulphur. The mine is developed by over 3,000' of workings including tunnels of 140 and 350 meters length, estimated to show 250,000 metric tons of ore, with 150,000 tons blocked out for stoping.

Equipment includes a 1,500-h. p. hydraulic installation, with 120-h. p. electric and 120-h. p. gasoline plants. There are two 66-h. p. hoists, and the company owns 29 buildings, including 2 stores and has a sawmill. The concentrator is of 200 metric tons daily capacity. The mine and mill are connected with the Trondhjem-Kristiania railway by a 22½-kilometer aerial tram. Production was 33,000 metric tons of ore, estimated by management to have averaged about 3.5% copper, 1909, and about 30,000 metric tons of ore in 1910, giving estimated productions of 2,000,000 lbs. fine copper in 1909, and 1,850,000 lbs. in 1910. Mine yielded 26,893 tons of export ore in 1912, of which 23,896 tons were shipped. The stock pile at the mine had 72,000 tons and the quay at Trondhjem 14,000 tons of ore in June, 1913. The management plans opening about 500 meters of tunnels and shafts, adding an air compressor, and completing the equipment of its 200-ton concentrator.

RUDIANSKI MINES.

RUSSIA

Owned by Nijni-Tagilsk Mines & Works, Bogoslovsk, Russia, and described under that title.

RUESGA; SOCIEDAD ANONIMA COBRES DE.

SPAIN

Idle. Office: Bilbao, Spain. Mines near San Martín de Los Herreros, Palencia, Spain, and Dehesa de Montojo, León, Spain. Don Julio Lazúrtigui, pres.; Don Augustin Cortina, sec. Organized 1901, capitalization 1,500,000 pesetas, shares 500 pesetas par. Property includes the Leonora and adjoining mines.

RUTHERFORD COPPER MINING CO.

TASMANIA

Idle. Mine office: Burnie, Russell Co., Tasmania. Ore said to average 7.5% copper.

SAAVEDRA i BESA.

CHILE

Mine office: Quebradita, Freirina, Atacama, Chile. Cornelio Saavedra and Alfaro Besa, owners and managers. Lands, 3 hectares, 27 kilometers

from Peña Blanca, showing a fissure vein in granite of about 5' average width, with strike of N. 42° E., and 66° dip. The vein opened to 1,370' in depth and for 886' along its course, shows an oxidized zone 131' deep, succeeded by sulphides, mainly chalcopyrite with quartzose gangue, averaging 16% copper. Water is encountered at 110'. Equipment includes a steam plant with three 70-h. p. boilers, and an electric plant for lighting and actuating pumps and the mill.

SADO MINE.**JAPAN**

Owned by Mitsu Bishi Goshi-Kwaisha.

ST. DAVID'S GOLD MINES (1903), LTD.**WALES**

Office: 29 Cornhill, London, E. C., Eng. Mine office: Barmouth, Merionethshire, Wales. Godfrey C. Isaacs, chairman; James Junner, sec. Organized July 21, 1903, under laws of Great Britain, as a reconstruction of St. David's Gold & Copper Mines, Ltd., capitalization £60,000, shares 5s. par. Debentures, £40,000, authorized, at 6%; issued, £10,750. The old company paid dividends of 70%, and the present company paid 1 dividend of 3d. per share, July 11, 1904, and Feb. 15, 1905.

Lands, 800 acres, carry gold and copper ores. Equipment includes a 50-stamp mill and an Elmore vacuum oil flotation plant.

SAINT GOBAIN CHANNY ET AREY; SOCIÉTÉ DE.**SPAIN**

Office: Place des Sanssaies, Paris, France. Company was organized for the purpose of acquiring the property of the Romanera Copper Co., Ltd., which was practically a reconstruction of the Anglo-Spanish Copper Co., Ltd., which in turn was the successor of the Spanish Copper Co., Ltd., and thus putting an end to protracted litigation which has involved these companies since the first reorganization.

Lands, 180 hectares, about 444 acres, perpetual leasehold, including La Carolina, La Infanta, La Fronteriza San Vicente and other mines, in the Paimogo district, lying between the Tharsis mine and the Rio Chanza.

The San Vicente mine is said to carry about 3 miles of the strike of the San Vicente vein, a low-grade copper deposit of about 20' average width, reported by former operators to have given assays of 2.71% copper, 28.1% sulphur, 1 dwt. gold and 2 oz. silver. The property also shows 6 contact deposits, between porphyry and clayslate of which 3, opened by shallow shafts, are said to average 30' in width and 500' in length. The San Vicente is supposed to have been opened by the Phœnicians, and was reopened 1862, 1872, 1883, 1901, and 1905. The mine has about 1 mile of workings, and apparently has been quite stoped out above the adit level, where there is an 1,800' tunnel.

The Valrubio group, at Paimogo, includes the Valrubio, San Carlos and San Andrés mines; lying between the San Vicente and Monterubio groups, and said to carry the western extension of the San Vicente vein system, but apparently this group is on the strike of the quartz-porphyry vein system running from Sierracilla to San Bonito, with narrow veins of low-grade complex ore. La Carolina and La Infanta mines are undeveloped, but the former has shown ore giving assays up to 30% copper, and La Infanta was claimed, by the Anglo-Spanish Copper Co., Ltd., to have ores giving assays of 4% copper and 12 oz. silver per metric ton.

The property of this company as a whole lacks cheap transportation being 5 miles from the Guadiana railway, and as the ores are complex, low in metal tenor, and difficult of treatment, the future of the mines of this zone depends mainly on utilization of the sulphur values.

ST. MUNGO COPPER MINES, LTD.**QUEENSLAND**

Office: Bow St., Charters Towers, Queensland. Mine office: St. Mungo, Cloncurry, Queensland. Angus McCallum, chairman; A. R. Graham and R. J. Hand, directors; D. M. Leyden, sec.; Jas. Matheson, mgr. Organized

Dec. 11, 1909, under laws of Queensland, capitalization £5,000 10s. par, increased July, 1912, to 40,000 shares with par value reduced to 2s. 6d.; fully issued and fully paid. Dividends were 60% in 1911 and 80% in 1912. Cash assets Aug. 1, 1912, were £2,318.

Lands, 50 acres, leasehold, in the Cloncurry district, 22 miles from a railway. Country rock is granite. The mine is opened by a 162' shaft, with about 240' of workings, showing chalcopryite ore with about 23% copper and \$2 gold per ton. There is no power equipment, but the installation of an oil-burning engine was planned, July, 1913.

ST. NEOT MINING SYNDICATE, LTD.

ENGLAND

Liquidated. Formerly at Liskeard, Cornwall, Eng. See Vol. X.

ST. SYLVESTER; SILBERBERGWERKE.

GERMANY

Office: Strassburg, Germany. Mine near Markirch, Elsass-Lothringen, Germany. Frédéric Gross, Léon Ungemach, Emil de Bary, Paul Lacour, Dr. Julius Schaller and Josef Vogt, directors; Paul Ferdinand Werner and Dr. Heinrich Ungemach, executive committee. Organized 1909, under laws of Germany, capitalization 450,000 marks, shares 450 marks par, as successor of Weilerthaler Bergwerke G. in. b. H., taking over all assets of that company for 225,000 marks, in stock, and giving, in addition, 627 shares of common stock, with provision that these additional shares shall participate in distribution of net earnings, after allowing for depreciation and other charges, including dividend deduction of 5% on regular stock, one-half of profits going to holders of the 627 shares of common stock.

Lands include the St. Sylvester mine, having a 53-meter shaft, and the Donner and Katz mines, carrying argentiferous gray copper and antimony ores. Idle several years.

SAM EYDE CO.

NORWAY

See Norske Aktieselskap für Elektrokemisk Industri.

SAN AGUSTIN; MINA.

CHILE

Mine office: Los Bronces, Los Condes, Santiago, Chile. Mine, opened to depth of 426', has irregular workings owing to orebodies being considerably broken and faulted, but the ore developed is of good tenor. The dump has about 20,000 metric tons of 5% ore, valueless at present, but of a sort highly suitable to wet concentration. The mine has no machinery, and used mules for transportation, at last accounts, employing about 70 men. Ore produced is sold to the Maitenes smelter of the Compañía Esplotadora de Lota i Coronel.

SAN BARTOLO; SOCIEDAD.

CHILE

Office: Calle de Compañía 1213, Santiago de Chile. Mine office: San Bartolo, Antofagasta, Chile. Luis Claro Solar, chairman; Guillermo Subercaseaux, vice-chairman; José Luis Santa María, sec. and Carlos Larrain Claro, directors. Organized Aug. 8, 1905, under laws of Chile, capitalization £120,000, shares £1 par.

Lands show 5 sandstone beds, carrying disseminated native copper. Equipment includes a 200-ton mill of modern design, built 1908, equipped with 2 Blake crushers, 3 Chilean mills, 2 sets of rolls, 2 jigs and 12 Wilfley tables. Property considered promising. Idle several years, company's funds having given out.

SAN CRISTOBAL MINING CO.

SANTO DOMINGO

Office: 807 Baily Bldg., Philadelphia, Pa. Mine office: San Cristobal, Santo Domingo. I. B. Thorn, pres.; F. M. Justice, vice-pres; Walter Smedley, sec.-treas.; Dr. E. Fahrig, cons. engr.; preceding officers, A. R. Justice, José DePool, A. L. Earnshaw, H. B. Wall, E. J. Hedden and W. E. Jackson, directors. Organized May 12, 1909, under laws of Arizona, capitalization \$2,325,000, shares \$100 par, nonassessable; issued, \$1,500,000. Bonds

are prohibited by the charter. Logan Trust Co., Philadelphia, registrar and transfer agent. Annual meeting, first Wednesday in June. Company has a share interest in the Blanton Copper Mining Syndicate.

Owens upwards of 250,000 acres, freehold, mainly timbered, in the San Francisco district. The management reports that its property carries malachite and azurite in the surface zone, succeeded by chalcopyrite and bornite at depth, ores being estimated to average 3 to 6% copper, 2 oz. silver and \$2 gold per ton. Smelter shipments of 138 tons of well selected ore returned \$24.44 copper values, and \$12 gold per ton.

The company is not directly engaged in mining, preferring to sell or lease tracts to others for either cash, or a share interest in the vendee company. Is not favorably regarded.

SAN DOMINGOS; MINA.

PORTUGAL

Owens by Mason & Barry, Ltd., at Pomaraõ, Alemtejo, Portugal.

SAN JUAN; SOCIEDAD MINERA.

CHILE

Office: 55 Calle Prat, Valparaiso, Chile. Mine office: Higuera, Coquimbo, Chile. Guillermo Lyon, pres.; José María Muñoz, managing director; E. A. Sandiford, Ruperto Alvarez and Cirilo Armstrong, directors; Miguel Scantlebury, gen. mgr.; Ricardo Spargoe, mine supt.; Ricardo Everett, smelter supt. Organized Feb. 17, 1906, under laws of Chile, capitalization 1,000,000 pesos, in 300,000 pesos preferred and 700,000 pesos common shares, par 20 pesos, 10 pesos paid in. Semi-annual meeting, March and September.

Lands, 66 hectares and a 9-hectare mill site, known as Ají é Anexas, at Minas Casas. The property shows syenite and diorite, cut by several fissure veins with E.-W. strike, dip of 60°, and widths of 5 to 10'. The main vein, of about 2 meters average width, yields sulphide ore of 6 to 7% copper tenor. Development consists of the following shafts: Las Casas of 70', Ají of 500', Aguilas of 240', Rosario of 300', Cocinera of 240', Capriciosa of 700', San Juan of 1,200', Ierma of 200', and San Pablo of 600'. The mines were opened 1820, and have been in continuous operation since, being among the oldest copper producers of Chile.

Equipment includes a 100-h. p. power plant, with 6 hoists, said to be good for 1,000' depth each, and a Siemens & Halske generator for lighting, and driving 4 electric drills. Buildings include a machine shop, carpenter shop, smithy and about 50 dwellings for employees.

There are 2 smelters, having a combined capacity of 230 metric tons daily. The San Juan smelter, connected with Las Casas mine by a 1,069-meter aerial tram, has five 16-ton reverberatory furnaces and 12 kiln calciners. The Nuevo Porvenir smelter, at Higuera, in the valley about a mile below the mine, has a 120-ton rectangular blast furnace, burning bituminous coal and making 50% matte, sent to the Guayacán smelter for conversion, the nearest shipping port being Totoralillo, 12 miles distant, with 7 to 8 pesos per metric ton transportation charge.

SAN MIGUEL COPPER MINES, LTD.

SPAIN

Secretary and office: R. L. Rodger, 738 Salisbury House, London, E. C., Eng. Mine office: Almonáster, Huelva, Spain. C. C. D'Anvers, chairman; Dr. N. Brückner, managing director; H. Schmitz, M. Paisant, N. Brown, A. Harter and C. A. Massasuti, directors; F. O. Harvev, cons. engr. Organized Oct. 12, 1904, in Great Britain, capitalization £150,000, shares £1 par; increased, Nov., 1908, to £200,000; fully issued and fully paid. A former debenture issue of £75,000, at 6%, was redeemed, 1905. Dividends were 18¾% in 1906 and 7½% in 1912. Accounts for 1912 showed a profit of £18,389. Reserve fund was £50,000 in 1912.

Lands, 1,900 acres, including the San Miguel and adjoining mines of cupriferous pyrites. The property was worked, for some years, by Sociedad

Mineira de San Miguel de Huelva, a Portuguese company, until taken over 1904, by the present owners. In 1907 the opencast levels of the mine caved, since which time production has been limited to underground ore extraction. The mine has ore reserves, estimated, 1912, at 700,000 long tons, and in addition there are about 450,000 tons of partly leached ore on surface, in heaps. Underground ore reserves are estimated at 2.5% copper tenor.

The company owns a 12-mile private railway, built at a cost of £40,000, from Almonaster to El Cerro connecting at the latter point with the Ferrocarril Zafra y Huelva.

Production has been as follows: 1,612,800 lbs. copper in 1904, 978,880 lbs. in 1906, 797,440 lbs. in 1907, 1,124,480 lbs. in 1908, 1,438,080 lbs. in 1909, 1,635,200 lbs. in 1910, 1,729,280 lbs. in 1911, and 1,422,400 lbs. in 1912.

SAN PEDRO; SOCIÉTÉ ANONYME DES MINES DE.

SPAIN

Office: 28 Rue de Châteaudun, Paris, France. Mine office: Zalamea La Real, Huelva, Spain. M. E. Ascherson, chairman; J. Mesnier, H. Prévost and A. Taraud, directors; Carlos Marchal, agt., at last accounts. Organized Feb. 27, 1899, under laws of France, capitalization f450,000, increased later to f600,000, shares f100 par. Lands include the Barranco de los Buyes group of 10 old mines, 167 hectares.

SAN PLATON; COMPAGNE DES MINES DE CUIVRE DE.

SPAIN

Office: 7 Rue Pillet-Will, Paris, France: Mine office: Almonáster, Huelva, Spain. Guillermo Sundheim, manager, at last accounts. Organized Oct. 18, 1906, under laws of France, capitalization f3,000,000, shares f100 par. Paid dividends of 5% in 1907 and 5% in 1908.

Lands, 46 hectares, including the San Platon, Segundo San Platon and Aumento de San Platon mines.

SAN RAMÓN DE FREIRINA; COMPAÑÍA MINERA.

CHILE

Office: Santiago de Chile. Mine office: San Juan, Atacama, Chile. Organized 1904, under laws of Chile, capitalization 160,000 pesos, shares 100 pesos par. No trace of operations secured.

SANTA BÁRBARA; CIA. INDUSTRIAL y MINERA DE.

PERU

Mine office: Yauli, Junín, Peru. Dr. Octavio Valentine, manager, at last accounts. Property is a custom smelting plant, 112 miles from Lima, at an elevation of 13,420' above sea level, 6 miles from Morococha by trail and about 25 miles by rail. Ore is received mainly by llamas, which carry average loads of about 110 lbs., and the railroad finds it difficult to compete with the llamas, owing to heavy grades and the great cost of rail construction. The plant includes a small calciner, hand reverberatories, and 3 water-jacket blast furnaces of 25, 50 and 100 tons daily capacity. There is a 20-ton Krupp ball mill, jigs, spitzkasten, centrifugal separators and dryer, a 6' pulp mill and a Van Meter oil concentrator. Power is furnished by a 60-h. p. turbine.

SANTA CECILIA COPPER MINING CO., LTD.

ENGLAND

Dissolved, 1901. No trace of operations obtained.

SANTA INES MINING CO., LTD.

PERU

Former mine office: Morococha, Junín, Peru. No trace of operations secured, and apparently abortive. See Vol. X.

SANTA INES y MOROCOCHA; COMPAÑÍA.

PERU

Office: 193 Calle de Aparicio, Lima, Peru. Mine office: Morococha, Junín, Peru. Roberto Pflucker, pres.; Leopoldo Pflucker, vice-pres.; Porfirio Silva, sec.-treas.; Vicente Pazos y Sacio, gen. mgr.; León Torres, mine supt., at last accounts. Organized under laws of Peru, capitalization 1,200,000 soles.

Lands, 120 claims, 240 hectares, and the Hacienda Morococha, 6,000 hectares, in the Tuctu district. Mineral lands are in the Morococha basin, which has 4 large lakes, connected by streams with waterfalls available for

power purposes. Mines include the San Francisco and San Miguel, carrying fissure veins and contact deposits between limestone, diorite and quartz-porphry. The veins, though narrow, averaging but 3' or so in thickness, carry persistent paystreaks of rich ore characterized by sulphoarsenide copper ores, ranging up to 25% copper and 16 oz. silver per ton.

Development includes the 985' Ausiliar, the 1,968' Media Falda and the 2,625' Laguna tunnels, with about 9,841' of workings. Ore produced is sorted into 2 grades, averaging 44.18% and 13.86% copper, respectively, and for the first 6 years of operation, ore averaged 25.78% copper and 330 grams silver per ton after selection. The mine is reached by the Ferrocarril Central del Peru.

Equipment includes a hydro-electric installation, with a 40-kw. Siemens Halske generator for light and power, and 3 electric drills. Fuel is domestic coal costing about 9 pesos per ton, and cost of mining was given by company as averaging about \$2.50 per ton, ore being dressed to an average copper tenor of about 25% and sold to the Casapalca smelter. There also is a small gold mine, known as the Santa Ines, at Castrovirreyna, Huancaavelica, Peru, having a 6-ton amalgamating plant.

At last accounts the property was under option to Messrs. Haggin and McKim, apparently for the Cerro de Pasco Co.

SANTA RITA DE ARQUEROS; SOCIEDAD MINERA. CHILE

Office: Santiago de Chile. Mine office: Arqueros, Coquimbo, Chile. Organized Dec. 12, 1905, under laws of Chile, capitalization 400,000 pesos, shares 50 pesos par. No trace of operations securable.

SAYAPULLO; COMPAÑIA MINERA. PERU

Office: Mogollon, 13, Lima, Peru. Mine office and works: Visto Bella, Sayapullo, Peru. Jose Balta, general manager. Organized Oct., 1908, in Peru, capitalization £75,000, shares £1 par, increased 1909, to £88,500.

Lands, 840 claims, on Sayapullo mountain, and 1,020 claims in the Huay-day coal fields, about 50 miles from Salaveery, the nearest rail point.

The Sayapullo property carries a number of parallel veins, traceable 2,000 meters, principal development being on 2 veins of about 12 meters width, showing up to 10% copper, 60 oz. silver and small gold values.

The coal property is extensive, showing 5 distinct veins, dipping at about 30°, and aggregating 8 meters in thickness. The coal is said to be anthracite of good quality.

Equipment includes a 30-ton smelter, with a 30x36" water-jacket blast furnace, erected 1910.

Property was under option to a French syndicate, at last reports.

SCAMANDER COPPER MINES, N. L. TASMANIA

Office: Royal Bank Chambers, Melbourne, Aus. Mine address: Scamander, via Mt. Balfour, Tasmania. Wm. Rain, chairman; J. S. G. Wright and P. J. Deely, directors. Capitalization £35,000, shares £1 par; issued 33,000 shares.

Lands, 160 acres, 8 miles from Scamander, formerly worked by the Balfour Proprietary Co. Development consists of several old shafts and tunnels, and a new shaft, 150' deep, showing silver-copper ore.

SCHULZ & WEHRENBOLD JUSTUSHÜTTE. GERMANY

Mine and works office: Weidenhausen, Hessen-Nassau, Germany. Property includes the Schulthalsberg mine, carrying iron and copper ores, and the Königsgrube, Siegenbach, Fides and Hainau iron mines. Smelter has 1 cupola only. Idle.

SCHWARZWÄLDER ERZBERGWERKE; GEWERKSCHAFT. GERMANY

Office: Freiberg, Germany. Mine office: Littenweiler, Baden, Germany.

Eduard Dahmen, Hermann Behrens and Jean Balthaser, executive committee; Max Reichard, supt. Company has 1,000 shares of unassigned value. Mines have silver-lead, zinc and copper sulphides. Equipment includes steam power. Mine and mill are connected by an aerial tram. Employed 200 men at last accounts. Production is about 300 tons of concentrates yearly.

SCOTTISH NORTH QUEENSLAND

EXPLORATION CO., LTD.

QUEENSLAND

Office: 16 Bothwell St., Glasgow, Scotland. J. M. Lochhead, secretary. Organized Aug. 19, 1907, under laws of Great Britain, capitalization £10,000, shares £1 par. Debentures, £5,000 authorized, £4,170 issued.

Lands, in the Klondyke district, Chillagoe, Queensland, were sold 1912, to the Mammoth Copper Mine, Ltd., for £350 cash and £5,500 in fully paid shares.

SEBORUCO MINES.

VENEZUELA

Property, near Seboruco, consists of a group of claims covering red sandstone hills that flank the main mountain range. These red sandstones contain 8 intercalated conglomerate beds, which vary from 1½ to 2½' thick, dip at 70° and carry copper glance and oxidized ores replacing vegetable matter associated with lignite. Ore is low-grade and cannot be profitably worked under present conditions.

SECRET COPPER MINING CO., N. L.

NEW SOUTH WALES

Mine office: Illewong, N. S. W., Aus. Jas. Wilson, manager, at last accounts. Organized Dec., 1907, under laws of New South Wales, capitalization £1,200, shares £10 par. The mine has a 250' shaft. Presumably idle.

SEIBAL; SOCIÉTÉ ANONYME DES MINES

DE CUIVRE DU.

BRAZIL

Office: 40 Rue de Chabrol, Paris, France. Mine office: Camaquã, Capava, Rio Grande do Sul, Brazil. Al. Fluert, president. Organized 1903, under laws of France, capitalization 415,000 francs, shares 100 francs par. Property, near the Camaquã mine, carries gold and silver-copper ore, and associated minerals. Idle.

SELLHEIM SILVER & COPPER MINES, LTD.

QUEENSLAND

Office: Darragh's Bldgs., Queen St., Brisbane, Queensland, Aus. Mine office: Sellheim, Sellheim Co., Queensland, Aus. F. W. Cröwe, secretary and manager. The property, near Sellheim, held under application for a mineral lease, is idle, and has not been worked for some years. Not favorably regarded.

SENZE COPPER MINE, G. m. b. H.

PORTUGUESE W. AFRICA

Office: Bremen, Germany. Mine office: Senze do Itombe, Angola (Portuguese W. Africa). Fr. Oloff, chairman; F. W. Meyer, vice-chairman; P. Barckhan, C. A. Wuppesahl and E. Haas, directors; C. H. Cremer, mgr. Organized April 26, 1910, under laws of Germany, capitalization 200,000 marks, shares 2 marks par.

Lands, 2 kilometers from Senze do Itombe, and 192 kilometers from Loanda, show a 5-meter bed of calcareous sandstone, dipping at about 20°, said to carry about 5% copper. Property was worked intermittently under former owners.

SEOUL MINING CO.

KOREA

Office: 418 First National Bank Bldg., Denver, Colo. Mine office: Hol-Kol, Hwang-Hai, Korea. H. Collbran, pres.; W. D. Townsend, vice-pres.; H. E. Collbran, sec.-treas.; A. H. Collbran, gen. mgr. and mg. engr.; preceding officers, J. S. Collbran, F. B. Lawson and S. L. Selden, directors; R. Blainey, mine supt.; F. F. Bostwick, purch. agt.; H. E. English, mach. supt.; F. C. Brown, mill supt., and J. P. Manning, chemist-assayer. Organ-

ized April 27, 1908, under laws of Connecticut, capitalization \$500,000, shares \$100 par; issued 4,000 shares. Dividends have been 25% in 1910; 50% in 1911; 50% in 1912, and 25% for the first half year of 1913, making a total of \$600,000 to July, 1913. Bankers Trust Co. of New York, registrar. Annual meeting, third Monday in October.

Statement submitted Feb. 10, 1913, shows total receipts, \$620,055 for 1912, compared with \$551,470 in 1911. Expenditures were \$263,708 and profit \$356,347 in 1912, compared with \$339,844 in 1911. This gives a 57.4% profit out of the gross receipts.

Company has a lease on the Suan concession, granted, Nov. 4, 1905, to the Korean Syndicate, comprising a tract of land 13x20 miles in extent, about 52 miles from Pyeng-Yang. The concession carries full rights to examine, develop and operate all mines and deposits contained within the area covered by the grant. Company also has permission to cut timber and to use all the water required for mining, milling and other purposes from sources within, or adjacent to the district. These privileges are given for a royalty of 1% on the gross value of the output of the mines. There is an additional annual tax of about 30 cts. per acre (50 sen for each 1,000 tsubo), on all land actually selected for mining operations, such selections to be made at any time before July 1, 1916.

The rights in this concession are secured to the Seoul Mining Co. by an agreement made with the Korean Syndicate which provides for the payment of 8% of the actual profits derived from the concession, clear of all depreciation charges, in addition to a 20% share interest in the Seoul Mining Co.

The property shows both granite and limestone, the principal orebody, known as the "Collbran Contact," lying between limestone and a batholith of granitoid rock. Ores carry gold, copper and bismuth, the gold seldom being visible and rarely in coarse condition. Silver is also present, alloyed with the gold to an appreciable percentage. The copper ores contain chalcopyrite, bornite and tetrahedrite, with a high gold content, of fair average, probably being about 1.5% copper and \$12 gold. The orebodies are irregular and in general parallel with the limestone-granite contact, connected more or less by generally well-defined fissures. The gangue is a highly silicious crystalline limestone, altered by contact action and containing a considerable amount of magnesia and alumina.

Ore reserves—

	1909.	1910.	1911.	1912.
Tons	172,450	190,100	211,400	421,000
Value per ton.....	\$18.38	\$17.64	\$16.55	\$14.44
Total value	\$3,169,600	\$3,353,400	\$3,499,000	\$6,080,000

Development is by a 500' inclined shaft and several tunnels, with about 25,000' of workings. Equipment includes a steam plant, with hoist and an air compressor.

The 40-ton mill at Sotario treated 32,793 tons of \$9.86 ore in 1910 and 70,229 tons of \$7.85 ore in 1911. In 1912 the mill handled 74,432 tons of \$8.25 ore at a cost of \$3.52 per ton with an extraction of 86.20% of the gold and 20.34% of the copper, or a total profit of \$4.73 per ton.

Production for 1912 was about 2,235,000 lbs. fine copper.

SERENA; SOCIEDAD MINERA DE LA.

CHILE

Mine office: Higuera, La Serena, Coquimbo, Chile. Lands include the Llanca and Llanquita mines, in the vicinity of the Mina Cocinera, having a vein of about 3' width, with E.-W. strike, opened to depth of 240 meters, and for length of about 400 meters. Equipment includes a 40-h. p. steam plant.

SEVILLE SULPHUR & COPPER CO., LTD.

SPAIN

Office: 30 George Square, Glasgow, Scotland. Operating office: Patio

de Banderas, Sevilla, Spain. Mine office: Aznalcóllar, Sevilla, Spain. Jas. Pipe, chairman; Arthur Henderson, A. N. Henderson and C. H. Graham, directors; John Munro, sec.; John S. Macdougall, gen. mgr. Robt. Andrew, mine mgr. in Spain. Organized Aug., 1877, under laws of Great Britain, capitalization £120,000, shares £10 par, fully issued. Is a close corporation, and publishes no accounts.

Property, at the eastern end of the Sierra Morena, in the province of Sevilla, carries pyrite with good values in copper and silver. The mine has been worked for many years by the present company, and is supposed to have returned good profits. Production was 2,867,200 lbs. fine copper in 1905; 4,569,600 lbs. in 1906; 4,152,000 lbs. in 1907; 4,838,400 lbs. in 1908; 4,076,800 lbs. in 1909; 3,651,200 lbs. in 1910; 3,427,200 lbs. in 1911; 3,113,600 lbs. in 1912.

SEYMOUR COPPER MINING CO., LTD.

ENGLAND

Office: 41 John Dalton St., Manchester, Eng. No trace of operations securable.

SHIRVAN MINING CO., LTD.

SCOTLAND

Office: 149 West George St., Glasgow, Scotland. R. C. G. Campbell, W. Kidston, H. Macdowall, J. S. A. Taylor and J. Kenneth, directors, at last accounts. Organized, Dec., 1910, capitalization £20,000, shares £1 par.

Company owns mining rights in Argyllshire, Scotland.

SIBERIAN COPPER CO.

SIBERIA

Mine office: Abakanski, Yenisei, Siberia. Acquired property of Yenisei Copper Co., 1911, for 375,000 rubles cash and 500,000 rubles in shares. Lands, 3 concessions, presumably 3,000 acres, include the Julia mine, an old property, in the district of Minoussinsk.

The Julia mine, opened by 5 shafts, deepest 250', shows highly silicious ore, averaging about 3% copper.

The smelter, one-fourth mile from the mine, has a 36x120" water-jacket blast furnace, which treats 60 to 75 tons daily, burning charcoal. The product is 40% copper matte, which is broken in rolls, roasted and then smelted with 3% fuel charges, in shaft ovens, to black copper of 88% copper tenor. This is shipped to Swansea for refining to a final product of 99.75% copper tenor.

SIBERIAN SYNDICATE, LTD.

SIBERIA

Secretary and office: J. A. Clark, 60 London Wall, London, E. C., Eng. A. Fell, chairman; A. Davidson, F. H. Hamilton, L. Ehrlich, H. A. Scott and E. T. McCarthy, directors; Charles A. Vaux, mgr., in Siberia. Organized June 3, 1902, reorganized Nov. 12, 1903, and again reorganized June 16, 1905, capitalization £100,000, shares £1 par; issued 52,055 shares, fully paid.

Company is a securities-holding corporation, with large share holding in the Atbasar Copper Fields, Ltd., and in other interests owning mining properties in the Lake Baikal district, in Siberia.

SIEMENS COPPER WORKS.

RUSSIA

Address: Kedabeg, P. O. Annenfeld, Government Elisabethpol, Caucasus, Russia. Gustav Koelle, first director, Hirschsprung 3, Berlin-Dahlen, Germany; A. Oehrn, second director, Kedabeg, Russia.

The Kedabeg (Kiadebek, or Kedabenski) mine is an old property covering 3 sq. kilometers, reopened by Siemen Bros. in 1864 and now practically exhausted. It is located on the side of the Miodagh, or Copper mountain, 29 miles S. of Dalliar, on the Trans-Caucasian railroad.

The copper deposits occur as lenticular orebodies enclosed in a mass of altered quartz porphyry that is over one-half mile long and one-fourth mile wide, lying between diorite and younger diabase porphyry. Kedabegite, a basic garnet-pyroxene rock, occurs near and is genetically con-

nected with the ore. The orebodies rest on the quartz porphyry and that rock is cut and partly covered by diabase porphyry. The ore lenses vary from 6 to 165' thick, 16½ to 165' in width and 33 to 820' in length. Sixteen of them have been found. The ore consists of pyrite, pyrrhotite, chalcopryite and covellite with accessory zinc blende. These minerals occur mixed with rock, often as small veins of pyrite shading into the country rock. Partings are entirely lacking. Ore varies from 1 to 7% copper.

Ore extraction has been by tunnels and mining done by the caving-in and by the pillar-and-stall methods. The output is sorted at the surface into 3 grades, viz.: smelting ore with 5% copper; leaching ore with 2% copper, and pyritic or sulphur ore, sold to the Baku oil refineries for sulphuric acid manufacture.

Ore carrying less than 4% copper is heap-roasted down to 8 to 10% sulphur content, formed into great heaps and exposed to the air and rain, the resulting copper sulphate solution being precipitated with iron shavings.

The smelting ore has been treated at the Kedabeg reduction works, about a mile from the mine, the plant treating about 160 tons per day. The plant has a 35-ton water-jacket blast furnace, installed 1912, and five 30-ton reverberatory furnaces receiving roasted ore from kilns and Gerstenhofer calciners. A matte carrying 30 to 40% copper is produced and this is reduced to black copper of 90% tenor carrying 0.08 to 0.1% silver and 0.004 to 0.006% gold per ton. The works, though old-fashioned, have done splendid service under their efficient director. The supply of smelting ore being exhausted, the property will hereafter produce only low-grade leaching ore and its copper production after 1913 is estimated at 500 tons, or 1,100,500, lbs. The change from shaft furnaces to the water-jacket blast furnace was due to the greatly increased price of naphtha; for the same reason, steam power has now been replaced by a 125-h. p. Diesel oil engine.

Production has averaged about 3,500,000 lbs. copper annually, since 1900. Production for 1912 was 15,333 tons of smelting ore carrying 4.8% copper and 33,000 tons of 1.5% ore, treated by leaching. The average cost of mining is given at \$5.50 per ton and of smelting of \$7.50 per ton, the finished copper costing 13.21 cts. per lb.

The Siemens estate is now developing the Kwarzchana mine on the Tschoroch river, about 40 miles S. of Batum, in the Caucasus. This property is said to have 50,000 tons of commercial ore proven as the result of exploratory work continued since 1902. A modern smelter is now in course of erection and will be in operation by March, 1914.

SIERRA CO., LTD.

SPAIN

Office: 32 Nicholas Lane, London, E. C., Eng. Mine office: 10 Plaza del General Santacildes, Burgos, Burgos, Spain. W. R. Smith, secretary. Organized April 2, 1898, under laws of Great Britain, capitalization £400,000, shares £10 par; debentures £482,600 outstanding, at 5%. The company also holds a railway concession. Company is reported to own various pyritic deposits in the provinces of Burgos and Logroño, Spain, as well as various iron, copper, silver and coal mines. Idle.

SIERRA MORENA COPPER MINES, LTD.

SPAIN

Office: 18 Ropemaker St., London, E. C., Eng. Mine near Peñafior, Spain. Arthur S. Plews, chairman; S. R. Adcock and H. O'Reilly, directors; E. T. Evans, sec. Organized April 17, 1900, capitalization £110,000, shares £1 par; issued £80,560. Lands, 215 acres, include La Preciosa and adjoining mines, claimed by the company to have developed ore reserves of 100,000 long tons. No returns secured for 1912.

SILVER SPUR MINING CO., N. L.

QUEENSLAND

Office and mine: Silver Spur, Queensland, Aus. Robt. Thos. Vyner,

chairman; Edgar Hall, sec. and gen. mgr; G. W. Dight, Dr. Watt and R. H. Bulkeley, directors. Henry Wann, mine supt. Organized 1897, in Queensland, capitalization £24,000, shares £1 par; fully issued, 15s. paid. Paid cash dividends of £22,900, and stock dividends of £3,140 in shares of other companies, to Dec. 31, 1912. Annual meeting, in March.

Lands, 49 claims, leasehold, and a 3-acre mill site, in the Stanthorpe district 47 miles from the Queensland Government railway. The property shows Gympie beds, with slate and Carboniferous limestone, having 4 fissure veins in slate, carrying lenticular orebodies of 1 to 30' width, the main orebody being 30' wide on the 300' level. The ore is a complex of copper, lead and zinc sulphides, averaging about 1.25% copper, 12% lead, 15% zinc, 26 oz. silver and 2s. gold per ton, with values mainly in silver,

The mine, discovered 1891, opened 1892, and since worked continuously, has shafts of 180', 520', 80' and 80', with bottom level at 500'. The company also controls a coal mine and coking plant, near Ashford, N. S. W. With the advent of railway transportation in 1914, the lead and zinc ores of the mine can be made to yield a return.

Equipment includes a 350-h. p. steam plant, with a hoist and a 5-drill straight-line air compressor. Fuel is coke and wood, latter costing 12s. per cord. The company also has a sawmill and a brickyard.

The reduction plant, rebuilt 1908, includes a concentrator and smelter, the former, receiving ore by tram line from the mine, having a Krupp ball mill, replacing a Chilean mill, and 2 jigs.

The 35-ton smelter has a Ropp calciner, a 100-ton 42x100" water-jacket blast furnace, and a 40-ton reverberatory furnace, with crane for handling slags. Product is a matte averaging about 35% copper, 600 oz. silver and 4 oz. gold per ton, sent to Europe for reduction. Bauxite bricks are used for lining the firebox of the reverberatory, and fuel is wood.

Production to end of 1912 was 1,021 long tons of copper, 1,361 tons lead, 1,898,536 oz. silver and 4,430 oz. gold.

SISSERT COMPANY, LTD.

RUSSIA

Office: Pinners Hall, Old Broad St., London, E. C., Eng. Sir J. B. Dale, Bart., chairman; W. Selkirk, A. C. G. Egerton and Ralph Peto, directors, in London; Prince A. D. Golitzin, Prince A. P. Ourousoff, G. Beneson and F. Landsberger, directors, in Russia. A. L. Simon, cons. engr.; N. C. Stines, resident engr.

Organized June 26, 1912, capitalization £1,000,000, shares £1 par; issued 755,000 shares, fully paid. Paid a dividend of 5% in 1913. Shares are listed on the London Stock Exchange. The Russian Trust & Finance Co., Ltd., holds an option expiring June 30, 1914, on 173,000 shares treasury stock. Title to property is held through the Sissert Mining District Co., Ltd., registered in Russia, which the company controls through ownership of entire share capital.

Lands, about 340,000 acres, held under a perpetual lease, in the Urals, 30 miles S. of Ekaterinburg, on the Perm-Cheliabinsk railway. The property includes many old copper, gold and iron mines and extensive forests, the principal copper properties being the Poleskoy and Gumeshevsky mines, which have been worked since 1727, and the Sysselsky, opened in 1906. There are also about 40 iron mines, yielding limonite ore of 40 to 53% iron content, with other mines yielding chrome and manganese. Iron ore reserves are estimated at 6,000,000 tons. Gold mining is confined to the alluvial deposits near the village of Sissert, where there is also a small quartz mine.

The Sysselsky copper mine is opened by 3 shafts, deepest 245', showing ore of about 5% copper tenor. Mine has a plant with a productive capacity

of 1,500 tons per annum, making its copper at a cost of about 10 cts. per lb. Ore reserves are estimated at 55,500 tons, with additional "probable ore" of about 150,000 tons.

The Gumeshevsky and Polefskoy mines, discovered in 1716, have been operated almost continuously since 1727. These mines are about 500' deep, and up to 1870 produced a total of about 63,500,000 lbs. fine copper, though only oxidized ore was mined. The orebody is a contact deposit, genetically related to augitic rocks, and lying between limestone and augitic biotite syenites, the oxidized ore occurring in a decomposed irony and calcareous clay belt, fully 2 miles in length and about 1,000' wide. The sulphide ores carry chalcopryrite in lenses of garnet-magnetite rock. The old ore dumps at the Gumeshevsky, consisting of clay material with fine ore that escaped hand-picking in earlier operations, are now being worked with excellent results. The dumps cover about 20 acres, and probably contain 550,000 cu. yds. of material averaging 23 lbs. copper per yard, much of which is recoverable by leaching, a trial run made on 38,000 cu. yds in 1908 yielding 175 tons copper, or about 10 lbs. copper per cu. yd. Old slag dumps at Polefskoy are also to be reworked. These dumps, estimated at 640,000 tons, are said to contain 1% copper, about 75% of which is thought to be recoverable by pyritic smelting.

Production 1912, was 3,339,840 lbs. copper, 6,467 oz. gold and 1,377 oz. platinum.

SJANGELI MINES.

NORWAY & SWEDEN

Office: Stockholm, Sweden. Mine office: Sjangeli, Nordland, Tromsø, Norway. Lands, 30 miles from the coast, include the Sjangeli, Alakats, Valfojokk and Ruopsuokjaure groups, partly in Tromsø, Norway, but mainly in Swedish Lapland. The property shows hornblendic schists, with thin beds of limestone and lenticular bodies of massive gabbro, ore containing cuprite, chalcocite, bornite and chalcopryrite, disseminated in a foliated schist. This ore is said to contain 2.5 to 55% copper, and to average 12.5%, which is much too high. Presumably idle.

SNELSTON COPPER MINE, LTD.

ENGLAND

Secretary and office: T. Allen, Snelston Copper Mine, Snelston, Derbyshire, Eng. E. M. Fox is permanent chairman and governing director, as long as he continues to hold one-sixth of the issued capital. Organized March 3, 1910, under laws of Great Britain, with capitalization £10,000, shares £1 par. Owns mining rights to lands at Snelston and Norbury, in Derbyshire, for which Mr. Fox received £1,500 in fully paid shares. No trace of operations secured.

SNOWBALL COPPER MINING CO., N. L.

NEW SOUTH WALES

Mine office: Gundagai, Wynward Co., N. S. W., Aus. Organized March 18, 1907. Lands, 38 claims, leasehold, on Snowball hill, 3 miles from Mt. Horeb railway station and 9 miles from Gundagai at the head of Snowball creek, a tributary of the Murrumbidgee river. The mine, discovered 1873, was worked vigorously from 1876 until 1880, when smelting was abandoned. The mine has a vein of 2 to 4' width, carrying chalcopryrite, opened by a 210' shaft, sunk by the old company, with bottom level at 175', and with laterals of about 300' length. The present company sunk a 25' shaft. Idle several years.

SOCIÉTÉ FRANÇAISE DES MINES DE CUIVRE.

CHILE

Office: 43 Boulevard Hausmann, Paris, France. Operating office: Iquique, Chile. Mine office: Collahuasi, Tarapaca, Chile. Company originally organized 1889, as Cia. Minera de Collahuasi, changed name to present title 1912. Capitalization 15,000,000 francs.

Lands, 251 claims, 1,211 hectares, principally on Collahuasi hill, near

the peak of that name, at an elevation of 4,480 meters above sea level. Lands include various mines, deepest workings being 500', carrying fissure veins in porphyry having an oxidized zone of about 100 meters depth, which shows argentiferous copper ore averaging nearly 20% in tenor, succeeded by chalcopyrite.

Principal property is the Pergolesi mine, having 8 levels opened on the Pergolesi and Delirio veins, showing ore of high average tenor. The Don Eduardo mine has a 36' orebody, claimed to average 30% copper on the 3rd level, a statement vouched for by authorities of excellent standing. On the 2nd level N. the Don Eduardo has various veins of 3 to 4' thickness, giving average assays of 66% copper, presumably from massive chalcocite. The San Nicolás mine has 2 levels opened, showing ores averaging 20% copper, with rich bunches up to 50% in tenor, in a vein of 16" to 8' width. The Anita mine shows ore up to 50% copper tenor in rich shoots, with long stretches of barren ground intervening. The Tiuque mine shows various small stringers of ore and has a vertical shaft, which will cut the Tiuque vein at a depth of about 45 meters. The Esperanza mine has the Empalme shaft of 3x5 meters section, and plans sinking a new shaft 250 meters to the S. The Sud-America mine has a 42' main shaft, showing a little ore.

The mines as a whole are said to have fully 250,000 tons of ore blocked out, averaging 9% copper, 12 oz. silver and 8 grams gold, with additional reserves, in backs and pillars, amounting to 100,000 tons of 20 to 25% copper ore. Production is around 1,800 tons of ore per month.

Transportation is by llamas to Carcote, but a number of aerial tramways are planned to connect the mines with the Ollague i Collahuasi railway. The property is one of exceptional promise, if given competent management and ample financial backing.

SOCIÉTÉ FRANÇAISE DES PYRITES DE HUELVA. SPAIN

See Huelva, Soc. Française des Pyrïtes de.

SOCIÉTÉ DES MINES DE CUIVRE DE NALTAGUA. CHILE

See Naltagua, Soc. des Mines de Cuivre de.

SOC. de ST. GOBAIN CHANNY et AREY. SPAIN

See St. Gobain Channy et Arey; Société.

SOCIÉTÉ DU SYNDICAT MINIER. ALGERIA

Office: 60 Rue St. Lazare, Paris, France. Mine office: La Calle, Algeria. M. Charret de la Fremoire, chairman. Organized May 3, 1906, under laws of France, capitalization f2,500,000, increased 1907, to f6,000,000, and again increased 1907, to f10,000,000, shares f100 par. Property includes the Kef-oum-Theboul copper mine in Algeria, zinc properties at Santander, Spain, and several zinc mines in France. The Kef-oum-Theboul mine, 11 kilometers S. E. of La Calle, first opened 1848, has a strong vein traversing schists and limestone and carrying cupriferous pyrite, argentiferous galena and sphalerite in ores with schistose gangue. This ore, after selection, assays 2.5 to 14% copper and 14 to 53 oz. silver per metric ton.

SOUTH AFRICAN COPPER TRUST, LTD.

RHODESIA & PORTUGUESE EAST AFRICA

Secretary and office: E. J. Sloan, 277 Salisbury House, London, E. C., Eng. Operating office: Bulawayo, Rhodesia. R. Simpson, chairman; J. F. Walker and C. A. Dodds, directors. Organized Sept. 23, 1910, under laws of Great Britain, as a reconstruction of the Consolidated African Copper Trust, Ltd., which went into liquidation Oct. 4, 1910, capitalization £375,000, shares 5s. par; issued 1,048,735 shares, fully paid. Stockholders of the old company took 558,000 shares, of 5s. par, in exchange for a similar number of £1 shares. Apparently the London & Johannesburg Trust guaranteed 75% of the new capital, to acquire control.

Lands are very extensive, including producing mines in the Manicaland of the Mozambique Co.'s territory, Portuguese E. Africa, and large tracts in Rhodesia. Property includes 236 claims in the Lomagunda district; 930 in the Victoria district; 20 in the Umtali district; 70 in the Tuli district; 380 claims and a 20% interest in 190 claims additional, in the Kafue district; 23 claims in the Gwelo district; 60 in the Bechuanaland protectorate; 2 farms, of 1,500 morgen each, in the Lomagunda district; 2 coal areas in the Victoria district, and the right to locate 430 claims N. of the Zambesi river. The company also owns a half interest in a syndicate holding copper claims in Namaqualand, Cape Province, and a share interest in the North Zambesia Coal Syndicate, Ltd.

The Alaska mine, 90 miles N. W. of Salisbury, in the Lomagunda district, shows the largest ancient workings in Rhodesia, these having an extreme width of 600', and extending for about 1,700' in length, with an extreme depth of 70'. The orebodies are estimated at 150' width and 1,700' length, which estimate seems high. Diamond-drill borings have shown copper ore to depths of 200 to 800', and the company estimates that 300,000 tons of cupriferous schists of 3% copper tenor are exposed above the water level. Ore minerals are mainly malachite, disseminated through silicious and calcareous schists. The Alaska mine has been idle some years.

The Umkondo mine, 10 miles W. of the Subeni river, and about 115 miles E. of Victoria by wagon road, shows remains of ancient workings inferior only to those of the Alaska mine, extending for a length of about 1,500', and with an extreme width of 300', and there are some open pits of 60' depth, with occasional shallow shafts, from which ore has been stoped to the water-level. The copper occurs mainly in the form of malachite and azurite, as seams and incrustations in sedimentary shales and sandstones, overlying an older granite, apparently unconformable, and intersected by numerous dolerite dikes, the copper apparently having been introduced into these beds along zones of fracture. The Umkondo has been tested extensively by diamond drilling, cores giving average assays of 9% copper, and several shafts have been sunk showing 2 veins, with a shallow oxidized zone. Considerable new development work has been done at the Umkondo, and the management estimates the prospective tonnage at 91,285 long tons of 8% copper ore.

The Edmundian mine is near Macequece, Manicaland, in Portuguese E. Africa. The mine is near the Rhodesian border, 3 miles from a railway, and is opened by shafts to the 7th level. Ore occurs in a fissure vein in talcose schist, varying in width, but with fairly regular contents ranging from 5 to 15%, with an average return from ore actually mined of nearly 10% copper and carrying up to 3 dwts. gold per long ton. Ore is oxidized near surface, but mainly chalcopryite at depth, and is exceedingly friable.

A hydro-electric plant, on a river 6 miles distant, transmits current at 6,600 volts, stepped down for use at the mine.

At the mill, ore is hand-picked on belts, rich ore and barren rock being removed, ore discharged from end of belt averaging 4 to 5% copper, this ore being sent to a Robey crusher and 3 Holman pneumatic stamps, latter crushing ore to pass 300 mesh. The Holman air-cushion stamps have a rated daily capacity of 20 to 25 tons each, and were giving only about half duty at last accounts. Fine ore from the stamps goes to an Elmore oil concentration plant, yielding concentrates of 20 to 22% copper tenor, with tailings of about 1%.

The smelter, about a mile from the mine, blown in Oct., 1908, is connected with the mine by a 1-mile Ropeways aerial tram, which crosses a spur of the Sierra Isataca, over a precipice, with a difference of about 1,000'

in altitude. Elmore concentrates are calcined and sent to the reverberatory furnace, which makes matte, or pimple metal, that averaged 84.03% copper in 1908. The matte is crushed in small pieces, packed and shipped to England for sale. A blast furnace, built 1910, is planned to try semi-pyritic smelting, and also to treat the coarser ores, and slags from the reverberatory. The mill and smelter have not given entire satisfaction but it is hoped that they may be keyed up to do better later. The mine apparently is not large, but has fair sized bodies of ore, of excellent average grade.

Production secured entirely from the Umkondo and Edmundian mines, was valued at £22,000 in 1909, and £20,585 in 1910. Developing at present.

SOUTH AFRICAN TERRITORIES, LTD. GERMAN S. W. AFRICA

Secretary's address: C. C. Willson, Finsbury Pavement House, London, E. C., Eng. D. N. Shaw, chairman, E. Braetsch, A. L. Horner, Maj. V. Paget, K. Schmidt and E. Martin, directors. A. P. Scotland, Keetmanshoop, German S. W. Africa, gen. mgr. Organized Sept. 11, 1895, and reconstructed June, 1900, capitalization £500,000, shares £1 par; issued 482,328 shares, fully paid.

Lands, about 30,000 sq. miles, held under concession from the German Government, including farm lands aggregating 2,700,000 acres and mineral claims of 10,496 acres, at Aiais and Klein Kharas, in the Bondelswarts, Zwartmodder and Veldschoendrager territories. Farm lands are sold and leased. The mineral lands show copper, galena, wolfram and mica, and coal beds have also been located by drill borings near Auros, about 8 miles from Keetmanshoop.

The company is not directly engaged in mining, preferring to operate through subsidiary companies.

SOUTH AMERICAN COPPER SYNDICATE. VENEZUELA

Office: 2 Broad Street Place, London, E. C., Eng. Mine office: Aroa, Lara, Venezuela. E. Edwards, chairman; Chas. D. Comrie, sec.; W. J. C. Scrutton, mine mgr. Organized March 27, 1907, under laws of Great Britain, capitalization £7,500, shares £1 par, increased 1908, to £15,000 shares 2s. par; 98,905 shares fully paid and 51,095 issued as part paid. Dividends for fiscal years ended June 30 were 25% in 1909, 30% in 1910, 145% in 1911, and 250% in 1912.

Lands, 25,000 acres, freehold, 67 miles W. of Puerto Caballo, known as the Aroa or Quebrada mines, have produced about 60,000 tons fine copper, and were operated extensively, 1881-94, by the Quebrada Land & Copper Co., yielding 271,770 long tons of copper ore, valued at about £1,250,000. Property includes the Titiara mine, having a vein of 2 to 25' width, the San Antonio mine with a vein of 3 to 18' width, and the Aroa mine, having a vein of 50 to 75' width, of 2,000' known length, and of unknown depth, from which the oxidized ores have been mined, leaving a large body of sulphide ore in the lower workings. Only ore averaging better than 8% copper is shipped to Europe for reduction. A smelter, to treat the lower grade ores, is in the course of erection.

SOUTH URALS MINING, MILLING & SMELTING CO. RUSSIA

Is controlled by the Tanalyk Corporation, Ltd., and property described under that title.

SOUTHWEST AFRICA CO., LTD. GERMAN S. W. AFRICA

Secretary and offices: C. Launspach, 1 London Wall Bldg., London, E. C., Eng., and Unter den Linden 35, Berlin, Germany. E. Davis, chairman, C. E. Atkinson, M. von Brandt, G. Cawston, Dr. P. D. Fischer, J. B. Schroeder, F. G. J. Eckstein, Paul Mankiewitz and E. Woermann, directors; Ole Falk Moe, at Grootfontein, African mgr. Organized Aug. 18, 1892, capitalization £300,000, increased successively to £400,000, £500,000,

£1,000,000, and finally, in 1902, to £2,000,000, shares £1 par; issued £1,750,000. Dividends were 5% in 1908, 7½% in 1909, 5% in 1910, 7½% in 1911, 5% in 1912. Accounts to Dec. 31, 1912, showed profits of £81,908, and cash balance of £135,418, out of which the 1912 dividend, amounting to £87,500 had to be paid, April, 1913.

Property comprises about 20,000 sq. miles, in which company has mining rights and 3,500 sq. miles of freehold land, in Damaraland; a one-half interest in mining rights to 23,000 sq. miles, in Ovamboland; a large share interest in the Kaoko Land & Mining Co., owning 37,000 sq. miles freehold land; a two-thirds interest in the South African Co., Ltd., owning about 66,000 sq. miles of mining rights, in Angola, Portuguese S. W. Africa, nearly one-half interest in the Hanseatics Mining Co., owning mining rights covering about 15,000 sq. miles; a large share interest in the Otavi Mines & Railway Co., small interests in the Southwest African Mining Syndicate, the Otavi Exploring Syndicate, Ltd., and the Angola Exploring Syndicate, Ltd., and about £1,800,000 in cash, farm mortgages, and choice securities.

SPANISH COPPER CO., LTD.

SPAIN

Office: 2 Tokenhouse Bldgs., London, E. C., Eng. F. T. Fisher, chairman; Miguel Yglesias, managing director. Organized June 8, 1883, capitalization £150,000, shares £1 par; issued £110,000, fully paid. Property was sold, 1907, to the Anglo-Spanish Copper Co., Ltd., and property of this company consists of shares in the Anglo-Spanish Copper Co., Ltd., and rights to shares in the Romanera Copper Co., Ltd., which companies are in litigation with each other, and early 1913, were preparing to transfer the property to the Soc. de Saint Gobain Channy et Arey (which see).

SPASSKY COPPER MINE, LTD.

SIBERIA

Secretary and office: J. A. Clark, 60 London Wall., London, E. C., Eng. Mine office: Spassky Zavod, Akmolinsk, Siberia. Arthur Fell, M. P., chairman; Ernest Carnot, vice-chairman; F. H. Hamilton, Jean B. Depelley, E. W. Parker and F. Robellaz, directors; H. C. Wolmer, gen. mgr.; E. C. Vigeon, resident mgr.; C. Farmer, mine supt.; R. M. Percy, coal mine supt.; E. T. McCarthy, cons. engr.

Organized July 9, 1904, in Great Britain, capitalization £300,000, shares £1 par, increased March, 1908, to £500,000 and May, 1911, to £600,000, with a further increase to £1,250,000, authorized, 1913, for the purpose of acquiring the property of the Atbasar Copper Fields, Ltd., on the basis of 2 Atbasar shares for 1 Spassky share, and giving to shareholders the opportunity to acquire, at par, 1 new share for every 3 shares held. The consummation of these plans will result in an issued capital of £989,815. A former debenture issue of £242,650 has been entirely converted on the basis of 1 share of stock for each £3 debenture held, or repaid in cash at 105%. Dividends, paid semi-annually, were 15% in 1910, 17½% in 1911, and 25% in 1912. The report for the fiscal year ended Sept. 30, 1912, showed net profits of £174,796, compared with £87,911 in 1911, £68,409 in 1910, and £9,552 in 1909. The net cost per long ton of fine copper secured during first 6 months in 1913, is reported to have been £28 9s. 4d., or about 6.17 cts. per lb. of fine copper.

Lands, in the Kirghiz Steppes, in 2 main groups, about 300 miles apart, and 200 miles and 500 miles from the nearest point on the Trans-Siberian railway.

The Spassky group, comprising about 100 sq. miles, in the Akmolinsk district, includes the Yuspensski copper mine, and the Karagandy and Saran coal mines; also lands carrying iron and limestone.

The Yuspensski mine has a network of veins, at and near the contact of slate and arcose sandstone, in sedimentaries of Permian age. The 2 main

veins, known as the Annenski and Vladimir, or Yuspensski, are about 200' apart and substantially parallel, and it is thought they may join at depth. Principal development is on the Annenski vein, which is 10 to 60' in width, carrying a hanging-wall paystreak of massive chalcocite, succeeded by bornite, largely massive, with silicious gangue, followed by small quantities of chalcopyrite and occasional tetrahedrite, the vein growing gradually leaner in copper toward the footwall, which is imperfectly defined and carries low-grade copper impregnations. The gangue is mainly quartz and barite, and the ore is estimated by the company to average 12 to 20% copper. The upper workings show some native copper, cuprite, azurite and malachite. The mine was gouged for rich ore by the former owners, who left a large amount of low-grade material unstopped. The mine has been tested by diamond-drill borings to a depth of only 475', ore in the bottom of the holes assaying up to 67% copper, but further prospecting is planned.

The mining practice of the former owners was of the most primitive nature, with timbering costs averaging \$1.25 per ton of ore mined, and the timbering was subject to frequent crushes, owing to bad mining, after which new timbers were installed inside of the old, with the result of eventually reducing the mine openings to impassable dimensions.

The new development by the present company includes 6 shafts, of 120 to 560' depth. The 560' Annenski main shaft is sunk in the foot and connected with the vein by crosscuts. The 420' level shows a vein of about 30' average width, carrying ore of 10 to 40% copper tenor, with an average, from smelting returns of 20%. There are 3 shafts each on the Annenski and Yuspensski veins, and the Annenski vein was claimed to show, in a crosscut on the 300' level, in addition to the main vein above referred to, 651' width of vein matter, carrying gradually declining copper values, the crosscut ending in material of about 1% copper tenor, only, hence it is thought that the vein may prove materially wider than heretofore worked.

The 490' level of the Annenski shaft shows ore of 14 to 18% copper tenor, and the mine was estimated, 1912, to have developed about 100,000 long tons of ore, of 17½% average copper tenor.

Equipment at the mine includes a 700-h. p. steam plant, with a 50-h. p. hoist, good for 1,000' depth, and a 10-drill straight-line air compressor. There is a small test mill, with crushing and Elmore vacuum oil flotation plants. Buildings include a machine shop and smithy, with numerous dwellings for workmen, forming a small town, in which the company maintains schools, baths, a hospital and church.

The Karagandy coal mine, 24 miles N. W. of the smelter, has 2 seams of 60" and 65" thickness, and is said to yield about 60,000 long tons of coal yearly, supplying the company's requirements, in addition to furnishing a considerable production for sale. The mine is said to be producing coal for 6s. per long ton, at the pit's mouth.

The company has a 26-mile private railway, known as the Spassky-Karagandy line, of 600-mm. gauge, equipped with 5 locomotives and 75 cars, connecting the smelter and coal mine. The copper mine is about 500 miles from the nearest point on the Trans-Siberian railway, and transportation is by camels in winter and horses in summer, with an average freight charge of about £3 per ton. The smelter is 74 miles N. E. of the mine, and under the old management ore was carried in carts, but so much ore was lost in transit that the line became emblazoned by a purple train of bornite, visible for several miles. The Russian Government is said to have been considering, for several years, an extension of the Orenburg-Akmolinsk-Semipalatinsk railway to pass near the Spassky property.

The old smelting plant, which was poorly designed, has been patched

up and improved, but remains far from modern. The capacity is reported by the management as 80 to 100 tons daily. Equipment includes 4 blast furnaces, the works being designed for a capacity of 400 long tons fine copper monthly. The converter department has a 20-ton electric traveling crane and 2 stands, with shells of the Anaconda type, treating matte of 58% copper tenor and turning out blister copper averaging 99% copper. There is an electrically-driven quartz mill for pugging converter linings.

The smelter power plant has a 700-h. p. steam installation, 150-h. p. electric plant and a 150-h. p. air plant having 2 Roots' blowers and a Bessemer blowing engine.

A complete geological survey and report on the property was made, 1911, by Dr. James Mackintosh Bell.

The Athasar group, 28½ sq. miles, 250 miles N. E. of Djousalie, the nearest station on the Orenburg-Tashkent railway, includes the Kresto, Pokrofsky, Annenski and Nadiozhdenski mines, and a coal area of about 9 sq. miles, 65 miles from the mines.

The Athasar shows sedimentary sandstones, shales and conglomerates, on a plateau of about 20 square miles, lying about 70' above the level of the district, carrying numerous outcrops of malachite, and at depths of 50 to 70' from surface, are found sandstone beds mainly 18" to 8' thick and of 3' estimated average thickness, carrying bornite, claimed to average about 13% copper. Property shows a number of old pits of 30 to 50' depth in an area of about 30 acres, where oxidized ores were mined in the past. Eight different beds up to 25' in thickness are being developed, showing malachite to depth of 30 to 50' from surface, succeeded by bornite, chalcocite and a little chalcopyrite. Development is by 8 shafts of 40 to 150' depth. The mine has about 3,000' of workings. Management estimates that diamond-drill borings show about 625,323 tons of ore developed, estimated to average 10.2% copper. Diamond-drill boreholes have shown ore assaying 2 to 35% copper. The company claims an orebody 7 miles long and 1½ miles wide, with a secondary orebody of about 3 miles length and 1 mile width.

Equipment includes steam boilers and hoists of small capacity at the various shafts. Company has about 30 buildings, the main camp at the Pokrofsky mine including an office, laboratory, smithy, machine shop, stables and dwellings. The old office at the Kresto mine has been made a hospital. Fuel is balesh, or small bushes, and coal from the company's mines, latter estimated to cost, delivered, about 25s. per ton. Company plans further extensive development, with preliminary smelting tests, and survey for a 60-mile railway between the coal and copper mines, and early 1913, began the erection of a smelter of 100 tons daily capacity.

Production at Spassky has been as follows: 1906, 1,865,690 lbs. copper; 1907, 3,552,570 lbs.; 1908, 3,838,235 lbs.; 1909, 3,675,840 lbs.; 1910, 5,540,160 lbs.; 1911, 6,401,920 lbs.; 1912, 8,955,520 lbs.; 1913 (6 mos.), 5,877,760 lbs.

SPRING CREEK MINING CO., N. L.

SOUTH AUSTRALIA

Office: Wilmington, Frome Co., South Australia. C. J. Tuckwell, chairman; E. P. Dignan and Mark Gray, directors.

Lands, 1 claim, 32 acres, on Spring creek, 8 miles S. of Wilmington, on the northern flank of Mount Remarkable. The country rock is clay-slate and sandstone. Ores are cuprite, azurite, malachite and tetrahedrite, associated with iron, said to carry from 4 to 8% copper. Development is by a 140' shaft and a tunnel. Inactive.

SQUIRREL VALLEY COPPER MINE, LTD.

NORWAY

Office: 80 Coleman St., London, E. C., Eng. Mine office: Risør, Christiansand, Norway. W. W. Macalister, D. A. Onslow and J. H. Hosking, directors. Organized Oct. 28, 1909, under laws of Great Britain, capitaliza-

tion £35,000, shares £1 par. Property is the Ekorndalen mine, near Risör. No returns.

STADTBERGER HÜTTE AKTIENGESSELLSCHAFT.

GERMANY

Office: Postscheckkonto No. 1450, Köln, Germany. Mine office: Nieder Marsberg, Westfalen, Germany. Otto Meurer, chairman; Anton Hamers, vice-chairman; other directors, C. Hupertz and G. Bunge; Erich Meurer, mgr. Organized 1873, under laws of Germany, capitalization 2,250,000 marks, shares 600 marks par, as a reconstruction of the Stadtberger Gewerkschaft, which began operations A. D. 1150. Paid dividends of 112,500 marks to Dec. 31, 1907, with dividends of 2% in 1908, nothing in 1909, 1% in 1910, 1% in 1911, and 4% in 1912.

The mine is very ancient, having been discovered about A. D. 800, and has been worked, with few idle intervals, since A. D. 1150. The property includes the Friederika, Mina and Oscar mines, the 2 latter opened by new shafts. Ores carry malachite, chalcocite and bornite, estimated by the management to average about 1.6% copper.

Equipment includes a 400-h. p. steam plant, and a 60-h. p. water plant, developing electric power.

The reduction works include a crusher, smelter and 1-ton electrolytic refinery, latter treating argenteriferous copper precipitate, as ore is reduced mainly by leaching. Forces average about 400 men, with a yearly production of about 40,000 metric tons of ore. Production was 1,609,358 lbs. fine copper in 1905, 1,388,898 lbs. in 1906, 1,322,760 lbs. in 1907, 1,432,990 lbs. in 1909, 1,458,087 lbs. in 1910, 1,528,705 lbs. in 1911, 1,658,278 lbs. in 1912.

STRICKLAND MINE.

TASMANIA

Mine address: Temma, Tasmania. J. Shortall, owner. Property, near a seaport, shows a good vein of cupriferous hematite, carrying up to 23% copper after sorting.

SUBENI MINE.

NATAL

Mine address: Goudhoek, via Vryheid, Zululand, Natal. The property, on the Subeni river, 42 miles S. of Vryheid, shows granite, with bodies of schist carrying 2 veins of 4 to 8' width, developed to a depth of about 150' by shafts and tunnels. Ore, after sorting, was reported to have yielded 30% copper. Idle several years.

SULITELMA AKTIEBOLAG.

NORWAY

Office: Helsingborg, Malmöhus Län, Sweden. Mine office: Sulitjelma, Nordland, Norway. Lord-Lieut. G. Tornerhjelm, pres. and first managing director; Consul Nils Persson, vice-pres. and second managing director; Consul C. Ingelsson, sec. and asst. managing director; Holm Holmsen, gen. mgr.; preceding officers, Hon. Albert Berg von Linde, R. M. B. Schjölberg, Prof. Hjalmar Sjögren, Ivar Persson Henning, Vice-Consul Lloyd Lundström and Prof. Carl Sjunnesson, directors; Andreas Quale, mgr.; Fr. Carlsson, mine supt.; P. Kjölseth, mill supt.; J. Westly, smelter supt. Organized 1890, in Sweden, capitalization 3,000,000 kroner, increased 1906, to 6,000,000 kroner, and again increased 1908, to 8,000,000 kroner, shares 500 kroner par; issued 7,021,000 kroner. Paid a 6% dividend, amounting to 360,000 kroner, 1907, and has paid total dividends, to end of 1911, of 2,460,000 kroner. Annual meeting, in May.

Property, 253 claims, 55 acres, with a 1¼-acre mill site, and 193 sq. miles of miscellaneous lands, more or less mineralized, mainly in the Fauske district of Nordland. Lands include the Sulitjelma, Carlotta, Giken and Altens groups of mines. The company also owns the Vaddasguisa mine, in the Oksfjorddalen, in Skjervö and Kvaenangen herreds, the Vaddasguisa being the largest and best ore deposit so far known in the Oksfjorddalen.

The Sulitelma mines are situated within the Arctic Circle on the shore

of Lake Langvand, 400' above sea level and 12 miles E. of Fineidet, a port on the Saltenfjord. Discovered 25 years ago, they have been developed to an enterprise in which 1,600 workmen are employed and in which the Knudsen pyritic smelting process was invented and is still in operation. The ore consists of cupreous iron pyrite disseminated through mica-schist and sometimes found in massive state. This ore occurs in very long and narrow lenses on the contact between schist, amphibolite and olivine gabbro, the lenses running E.-W. on the N. side of the lake, changing to N.-S. on the S. side of the lake. There are 17 outcropping orebodies, 15 under development, which range from $1\frac{1}{2}$ to 30' in thickness, from 200 to 2,500' in length and 1 of them has been proven to a depth of 3,700'. The ore is sorted by hand and 4 grades produced; the first, called sulphur ore, contains 3% copper, 44% sulphur, and is shipped to acid makers; the richer ore carries 6% copper and 32% sulphur, and is smelted at the mines; the concentrating ore with 1.8% copper and 22% sulphur, is treated by water concentration and by the Elmore process. The waste, carrying 0.25% copper and 3% sulphur, is thrown on the dump.

Development is mainly by tunnel, there being 13,600' of crosscuts and 37,400' of tunnels, all in ore, at the end of 1912. The underground work is estimated to develop 2,502,000 metric tons of ore with 1,200,000 tons blocked out for stoping, 1913. Ore in sight at the present time is reported to be 1,900,000 metric tons. Underground haulage is by electricity.

The output, as mined, is divided into 2 classes, smelting ore with 4 to 8% copper and export or pyrite ore, with 1.5 to 4% copper, and an average of 45% sulphur. The total ore mined averages 2.45% copper and 45% sulphur. Of the sulphur ore exported, about 90% is fines and 10% lumps, shipped to various points in Norway, Sweden, Denmark, Great Britain and the Continent.

Power equipment includes a 970-h. p. hydraulic plant, 1,220-h. p. electric plant, 780-h. p. pneumatic plant and 10-h. p. gasoline plant. Equipment includes 17 hoists, of 5 to 30 h. p. each, good for depths to 900'. There are 5 air compressors, 3 at the mines and 2 at the smelter. The mine has 2 pneumatic drills, 1 Temple electric drill and 18 pneumatic hammer drills in service. There are 3 sawmills, a general store, 3 schools, a church and a Good Templars' lodge, with a large number of dwellings for employees, the company owning a total of 320 buildings.

There is an extensive system of aerial tramways, with 15 stations and 2 power stations, the tram system including a 4-mile line to the Jakobsbakken mine, which is to be operated more extensively in the future.

The frame concentrator, of 36,300 sq. ft. area, is equipped with 3 Hadfields and five 13x24" Krupp Grusonwerk crushers, 15 sets of rolls, 76 Hartz jigs, 17 Ferrari concentrating tables, 1 slime table and 62 sizers.

There is a separate mill of 12,800 sq. ft., containing an Elmore vacuum oil flotation plant, the largest Elmore plant in the world having 18 units, with a productive capacity of about 25,000 tons of 6.5% copper concentrates yearly. The plant went into commission April, 1909, and in the first year of operation produced about 8,000 tons of remarkably clean copper concentrates, carrying 6.75% copper, with an extraction of better than 80% of assay values. This Elmore plant is not only the largest installation in existence, but has given perfect satisfaction, redeeming all promises. Many small Elmore units, installed at other copper mines in other parts of the world, have proven unsuccessful, but the high saving and low costs of the Elmore plant at the Sulitelma show that the process, under suitable conditions, is a commercial as well as a technical success. The Elmore people state that the plant is operating at minimum working costs, and is consuming, for each

ton of ore treated, only 2.7 lbs. of the cheapest kind of common fuel oil, and no acid. Practically the entire production of the Elmore plant at the Sulitelma has been from tailings that were wasted before the installation of this process. This plant produced 1,163 tons of copper concentrate during Sept., 1913.

The 160-ton smelter, at Fagerlid, 2 to 5 miles from the various mines and receiving ore by aerial trams, has a 50-ton water-jacket blast furnace; 1 reverberatory furnace; two 50-ton pyritic smelting converters of the Kundsen type; 1 Wedge calcining furnace, with 8 hearths, 21' 6" in diameter; 1 gas-fired reverberatory furnace, with hearth 15x60', and 1 converter stand, with 10 shells of the Manhes type, 5' in diameter and 5' 6" in length. First-fusion product is a matte of 30 to 40% copper and final product is blister copper assaying 99.2%, sent for refining to the Helsingborg Kopparverks Aktiebolag, at Helsingborg, Sweden, where there is a leaching plant, in connection with the works. Ores smelted average 6 to 8% copper, 32 to 34% sulphur, 34 to 36% iron and 2 to 4.5% alumina, with traces of lime and magnesia.

The smelter employs the Knudsen discontinuous pyritic process, which largely utilizes the calorific value of the sulphur and requires a minimum coal consumption, effecting a very considerable saving in fuel cost. Pyritic and chloritic ores are smelted, the former yielding a fusible slag, the viscosity of which is much increased by the addition of the chloritic ore. For this reason slag is run into the forehearth and allowed to settle for 90 minutes, after which pyritic fines are added. The Knudsen furnaces, of 20 tons capacity each, are lined with magnesite blocks, set close together and luted with a bond of magnesite mortar and tar, applied hot. The wear is confined to the under portion of the furnace, up to 30 to 50" above the tuyeres, and is comparatively small, the working furnaces having run for 179 to 459 charges before linings required repairing. Two men are sufficient to work a furnace, 2 others attending to the forehearth, each forehearth sufficing for 2 or 3 furnaces. The loss in smelting low-grade ores amounts to 10% only, slags running only 0.2 to 0.3% copper, as against a former loss of about 15% of assay values, and the cost of smelting under the Knudsen process is given as 3s. per ton of ore, this covering wages, transportation of ore to the smelter and cost of fuel. Converter costs are said to be under \$1 per metric ton.

Miscellaneous enterprises of the Sulitelma include the ownership and operation of 7 steamers, 2 tugs, 40 barges, and a 13-kilometer private railway system, known as the Sulitjelmabanen, of 750-mm. gauge, equipped with 3 locomotives and 120 freight cars.

Production, for 1904, was 605 metric tons fine copper and 90,000 tons cupriferous pyrites exported, containing 2,442 metric tons fine copper, giving a total production of 7,614,688 lbs. fine copper; 10,479 tons of ore smelted, yielding 447 tons fine copper and cupriferous pyrites exported giving a total output of 6,225,856 lbs. fine copper in 1905; 589 metric tons fine copper and about 2,800 tons of copper contained in cupriferous pyrites exported, equivalent to about 7,000,000 lbs. fine copper, in 1906; 1,384,486 lbs. fine copper from ores smelted, and 102,000 metric tons of cupriferous pyrites exported, averaging 3% copper, giving a gross production of 8,140,562 lbs. fine copper, in 1907; 120,000 metric tons of cupriferous pyrites exported, 18,000 tons of copper ore and 8,000 tons of Elmore concentrates smelted, yielding 1,100 metric tons of Bessemer copper, with total copper contents equal to about 9,000,000 lbs. fine copper, in 1910.

In 1912, a total of 123,250 metric tons of cupriferous pyrites was exported and 14,850 tons copper ore with 11,500 tons of Elmore concentrates

were smelted, giving a gross production of about 11,000,000 lbs. fine copper. The Sulitelma has by no means reached the limits of its productive capacity, though by far the largest copper producer of Norway, and one of the richest copper mines of Europe. The management is progressive and competent, and has shown a high degree of technical ability in the successful utilization of the Knudsen system of discontinuous pyritic smelting, and the Elmore vacuum oil flotation process.

SUMITOMO COPPER CO.

JAPAN

Office: 36 Unagidani Minamiku, Osaka, Japan. Mine office: Niihama, Iyo, Shikoku, Japan. Works office: Shisakajima-Ochigun, Iyo, Shikoku, Japan. Kichizaemon Sumitomo, proprietor; M. Suzuki, director-in-chief; Munio Kubo, mgr.; preceding officers, Kinkichi Nakada, and K. Yukawa, directors; S. Maki and J. Matsumoto, sub-mgrs.; K. Arai, mine supt.; Keijiro Nakamura, smelter supt.

Owms the Besshi mine and other properties comprising 3 claims, 6,353 acres, besides a 5-acre mill site, 33,452 acres timber lands and 575 acres miscellaneous lands, in the Besshi district. The Besshi mine proper, on Besshi mountain, 4,400' in height, has an area of 209 acres. The timber lands carry large plantations of fir, set out yearly since 1879, which have now become available for mine timber, 15 to 20 years growth being required. Water supply is taken from the Kokuriu river.

The Besshi mine is situated near Kobe, 10 miles from the sea and 4,000' above it. It has been in the possession of the Sumitomo family for more than 200 years, being successfully worked by native methods until 1874. In that year modern methods of mining were adopted and the property is now the second largest mine in Japan.

The Besshi copper deposit is a bedded vein occurring in crystalline schists considered to be of Archæan age and characterized by chloritic and graphitic schists with serpentized dike rocks in the hanging country. The ore deposit itself is a vein of crushed quartz schist conformable in strike and dip to the enclosing rocks, but broken when they were folded. The vein is traceable for 6,000' and has an ore shoot which is 5,000' long, 2 to 25' and averaging 7' thick, that has been developed to a depth of 2,150' without decreasing in size or value. The ore is a mixture of chalcopyrite and pyrite interbanded with schist and carries from 3 to 4% copper, singularly free from other metals, the smelter product selling at Lake Superior copper prices, without electrolytic refining. Numerous parallel E.-W. stepfaults throw the orebody 10 to 20' and rarely 50'.

Development consists of an inclined shaft, 1,700' deep on the dip, with various adits driven to connect the workings with the surface. The main working level has been the third adit, a haulage and drainage way, 10x11' in section and 6,000' long. This adit carries a stream through the mountain which has a fall of 1,800' after leaving the mine and generates 6,000 kw. The latest work is a fourth adit, 16,000' long, from Hateba, the end of the private railway conveying ore from the mine to the sea. A shaft 16' in diameter and 1,875' deep is being sunk vertically from No. 3, or main working tunnel, to meet the new level. A face 10x13' is advancing in the tunnel at the rate of 200' per month.

The orebody is worked by ordinary overhand methods and the output is sorted at the surface into lump ore, constituting 70% of the product, fines 20% and waste 10%.

The mine has 9 main levels with largest production from the 6th and 7th levels. There is a system of natural ventilation by which warm air from the valley entering through the Tonaru tunnel escapes through the mouth of the Toyen shaft, near the crest of the mountain, the air current being reg-

ulated by brattices. The mine has 61,268' of workings, with about 2,500,000 tons of ore blocked out for stoping. The mine is well timbered, with a tram line on each level, and ore is blasted with guncotton, a little dynamite and occasional gunpowder. Electric pumps fork water from the lower workings to a large sump on the 8th level, whence it is discharged through the Tonaru tunnel which is lighted throughout by electricity and has the terminal station of an aerial tram at its portal.

The Nishinokawa mine is at Oboki-mura, Nii-gori, Iyo, Japan. This property shows quartz-schists with lenses of 3 to 12' width carrying chalcopyrite ore with 3 to 4% copper, associated with sphalerite, pyrite, magnetite and hematite, with quartz gangue. The mine employs an average of 225 men.

Mining equipment includes a 1,000-h. p. electric installation having three 200-h. p. electric hoists, good for 1,200' depth each, with three 120-h. p. Rand, two 120-h. p. and one 75-h. p. Leyner, and one 50-h. p. Schramm air compressors. As ore extraction is mainly through No. 3 tunnel, no exceptionally powerful machinery is required.

The concentrator at the mouth of the Tonaru tunnel, is of 700 tons daily capacity, equipment including 2 Blake crushers, 4 belt conveyors and 4 trommels, ore being assorted mainly by hand labor.

Owing to complaints by farmers of damage from copper-laden waters, a cementation plant was installed several years ago, and considerable copper is precipitated on scrap iron and coke, the production of 80% cement copper amounting to upwards of 200 tons yearly.

A 3,600-meter Bleichert aerial tram leads from the mill and tunnel to the railway at Hateba, this having a longest span of 600 meters, with an hourly capacity of 90 tons at an average speed of 2.5' per second. Hateba is the terminus of a railway running to Niihama, the nearest port. The connections between the mine and shipping wharf include about 2 miles of aerial tram and several miles of railway. The mine also has 3 aerial trams of 2,276', 5,200' and 5,178' lengths, respectively.

The company owns 2 private railways of 9.73 miles aggregate length, with 30" gauge, rolling stock including 10 locomotives, 10 box cars and 184 ore cars.

The company operates 3 electric plants, 2 driven by steam and 1 by water. The steam plant at the mine and hydro-electric plant at Otoshi, on the Kokuriu river, distribute electric energy to the mine, mill and shops, while the steam-electric plant at Shisaka furnishes power to the smelter.

The general shops at Niihama, about midway between the mine and smelter, include a foundry making castings up to 5 tons in weight, extensive carpenter shops, machine shops, boiler shops and smithies, these works not only making ordinary repairs, but turning out a large part of the machinery and castings used at the mines, works and smelter.

The Besshi smelter formerly was at Niihama, but owing to serious damage to neighboring farmers from smelter fumes, was transferred 1906, to the Island of Shisakajima, 12 miles from Niihama, only the general shops remaining at the old smelter site.

The new Shisakajima smelter, 20 miles from the mine, built at a cost of about 4,000,000 yen, is thoroughly modern in design and equipment. Ore is received from barges, strings of 10 being towed by tugs 10 miles and unloaded by a 20-ton crane, into cars operated in counterbalance, on an incline leading to the top of the works, which are laid out in 7 terraces, gravity being used throughout for the flow of material.

The smelter handles 600 metric tons daily of ore containing 30 to 33% sulphur mixed with 7% gneiss as flux and 4 to 5% coke. The fines are

nodularized with flux and water in a revolving conical wooden cylinder and afterwards pot-roasted in Nakamura roasting pots. The sintered ore, with lump ore and coke, is fed to the first blast furnaces which make a 20% matte and an 0.2% slag. This first matte is smelted a second time, making 33% matte and 0.3% slag.

The furnace building has four 160-ton 39x192" blast furnaces, of partial water-jacket type for ordinary or pyritic smelting, and a 400-ton 48x288" blast furnace for pyritic smelting. There are four 37-metric ton circular blast furnaces, each with a corresponding light reverberatory forehearth, with blast, for smelting roasted matte and making blister copper. There are two 15-metric ton reverberatories for refining, 1 being used as a spare, and 4 sets of Mabuki hearths, using an old Japanese process, improved by the Sumitomo Co., for the conversion of matte, these having a daily capacity of 32 tons of roasted matte each, 1 being held as a spare. Barren quartz pebbles are used for fluxing. No custom smelting is done. The product is blister copper averaging 99.8% in copper tenor, carrying traces of silver and gold. About 20% of the product is sent to the Osaka rolling mill, owned by the Sumitomo family, and the greater part of the remainder is sent to Kobe, whence exported, mainly to Europe.

The smelter power plant has 3 No. 4 and 3 No. 6 Connorsville blowers, and blast for the 4x24' pyritic furnace is furnished by a Curtis steam engine, direct-connected to a turbo-blower that delivers 750 cu. ft. per minute of free air, compressed to 1.24 atmospheres normally, with a maximum absolute pressure of 1.34 atmospheres. Steam for the turbo-blower is furnished at 200 lbs, initial pressure by a Babcock & Wilcox boiler. There is an air compressor for converter blast.

Fuel is coal at the mine, and coal, coke and waste gases from coke ovens at the smelter, coal being used for the reverberatories and reverberatory forehearths, with coal and wood employed for the roast stalls. Fuel costs are 4.2 and 4.7 yen per long ton for coal, according to grade, and 8.46 to 21 yen for coke, yearly fuel consumption being estimated by the management to average 9,333 long tons of coal and coke. The company has a coking plant at Niihama with 72 brick kilns, having a daily capacity of about 55 tons, using coal from the Keeki mine at Kiushiu.

The company owns a very extensive fleet of vessels, including 2 steamers for passengers and package freight, 1 steamer for carriage of coal, and 81 sailing vessels, with 20 sailing vessels held under charter. The company operates a passenger line, with a steamer plying between Niihama and Kobe, a distance of 125 miles.

The Besshi mine employs about 3,000 and the various enterprises of the company employ about 4,800 hands. The miscellaneous enterprises in connection with the Besshi mine are very extensive, including a large number of warehouses and stores, and a branch of the Sumitomo bank at Niihama. The company maintains a main hospital, with 4 branches, and supports 5 elementary schools for the children of employees.

Production of the Besshi mine was 11,973,833 lbs. fine copper in 1906, 11,781,824 lbs. in 1907, 11,476,519 lbs. in 1908, 14,725,305 lbs. in 1910, 15,145,070 lbs. in 1911 and 16,968,866 lbs. in 1912, at an estimated cost of between 9 and 10 cts. per pound for finished copper.

SUNDHEIM; SOCIEDAD COLECTIVA C. y J.

SPAIN

Office: Huelva, Spain. Mine office: Puebla de Guzmán, Huelva, Spain. Is an incorporated copartnership between Don Carlos Sundheim de la Cueva and Doña Justa Sundheim de la Cueva. Wm. Guthrie Bowie, mgr.; Jorge Riecken, mine supt. Property includes the Cabezas del Pasto, Monte Rubio,

Sierracilla del Tamujoso and Malagón mines, the first being under lease to the United Alkali Co., Ltd., and described under title of that company.

The Monte Rubio group includes the Monte Rubio, Gibraltar and Atbalcal Arbalcal mines, having a combined area of about 100 hectares, at Paimogo Huelva. These are ancient properties, worked only to the level of the nearest stream, in the Roman era, the old workings, though comparatively superficial, disclosing enormous masses of ore occurring as oxides, sulphides and sulphate, with gangue of iron ore, indicating the existence of large bodies of unaltered iron-copper sulphides at greater depth.

The Sierracilla del Tamujoso was a small producer, under former operators, but the ore is complex, requiring special treatment, and the property has been idle for some years. The Malagón is a group of government concessions, showing good outcrops, with numerous old workings, but also has been idle some years.

SUNIK MINES.

RUSSIA

Mine office: Evlach, Zangezhur, Transcaucasia, Russia. Lands, 30 miles from Evlach, on the Tiflis & Baku railway, near the Persian line, carry a system of fault fissures, of 7" to 4' width, cutting andesite and diabase. Development is mainly by tunnel, with 2 shafts, and workings are of a primitive nature, deepest being only about 130', at last accounts.

Twenty veins are known and those opened in mining show ore characterized by chalcopyrite, with occasional bornite, the output averaging 7% copper with gold and silver values.

SWAKOPMUNDER MINEN-GES.

GERMAN S. W. AFRICA

Office: Schellingstrasse 4, Berlin, Germany. Mine office: Gorob, via Swakopmund, German S. W. Africa. Organized under laws of Germany, capitalization 36,000 marks, to take over the Gorob mine and sundry other rights of the Deutsche Kolonialgesellschaft of the Southwest Africa Co., in the Guisib district. Property but slightly developed, at last report.

SWEDISH METALS EXTRACTION CO., LTD.

SWEDEN

Office: 19 Coleman St., London, E. C., Eng. Mine office: Falun, Dalarne, Kopparbergslän, Sweden. Col. F. Soratt Bowring, C. B., chairman; A. B. Lucas, sec. Organized July 5, 1907, under laws of Great Britain, as the Naversburg Falun Copper Mines & Works, Ltd., and name changed to present title, Nov., 1910. Capitalization £100,000, shares £1 par, in 20,000 "A" shares, and 80,000 "B" shares, increased, Aug., 1909, to £250,000, shares £1 par. No reports on recent operations, and company presumably is idle.

TACNA; SOCIEDAD BENEFICIADORA DE METALES DE. CHILE

Idle. Works at Tacna, Chile. Organized 1901, in Chile, capitalization 68,250 pesos, shares 250 pesos par. Company owns a smelter making matte of 50% copper when in operation.

TADERGOUNT MINE.

ALGERIA

Idle. Stora, Fietta et Cie., owners, Bougie, Philippeville, Algeria. Lands, 34 kilometers S. E. of Bougie, show a number of veins, in schist and shale, carrying gray copper and oxidized copper ores. The mine, slightly developed, has been abandoned several times, owing to flooding.

TAGLE; SUCESIÓN RUIZ.

CHILE

Mine office: Naltagua, Melipilla, Santiago, Chile. Property includes La Trinidad smelter, 9 miles from Talagante, having a 54" cylindrical water-jacket blast furnace and a 15-h. p. engine. Matte produced is exported to Europe. Last production reported, 1908, was 500,000 lbs. fine copper, secured from 3,840 metric tons of 6.5% copper ore smelted. The smelter was idle in 1909-10.

TALYSARN COPPER MINES, LTD.

WALES

Secretary and office: G. A. Scott, 5 Great Winchester St., London, E. C.,

Eng. Mine at Nantlle Vale, Talysarn, Carnarvon, Wales. T. W. Druitt, F. Hughes, directors. Merricks, Crane & Co., cons. engrs. Organized Feb. 23, 1907, under laws of Great Britain, capitalization £60,000, shares £1 par; issued, 59,500 shares. There are £15,000 six per cent first-mortgage debentures. Production 1911, 228 tons, averaging 18% copper.

TAMA MINE.

CORSICA

Mine office: Bastia, Corsica, France. Is a small producer of sulphide copper ore, shipped to Great Britain for reduction. No recent returns secured.

TAMAYA; SOCIEDAD ANÓNIMA DEL MINERAL DE.

CHILE

Mine office: Tamaya, Ovalle, Coquimbo, Chile. Organized 1906, under laws of Chile, capitalization 3,000,000 pesos, shares 20 pesos par. The company gave 1,360,000 pesos in shares for the property, and issued 1,240,000 pesos stock for capital, holding 400,000 shares in the treasury, for reserve.

Lands, 206 hectares, on the Cerro Tamaya, 5 miles from the railway station of San José. The property shows a N.-S. vein of variable width, with dip of about 45°, said to have a payshoot 20' wide, of high-grade ore. The property includes a number of mines which have produced considerable copper in the past, the mines having about 10,000' of workings, deepest of 2,300'. Development is mainly by a tunnel of 7,380' length. Management planned a very complete electric equipment, to include motors and hoists, traction engines, pumps and lights, but no traces of this work have been found. The mine is considered valuable, and if developed on a modern scale, with adequate capital, is believed to be capable of making a good mine.

TAMBILLOS SMELTING & MINING SYNDICATE.

CHILE

Idle. Mine office: Peñon, La Serena, Coquimbo, Chile. Capitalization £20,000, shares £100 par. Property is the San Felipe mine 1.2 miles from Peñon, having a 3' vein opened to depth of 160' and for length of 820'. Ore, carrying chalcopryite, associated with iron oxides, is used mainly for flux. The smelter, at Tambillos, completed 1908, receiving ore from the mine at a freight charge of 2 pesos per metric ton, has a 45" circular water-jacket blast furnace, 16-h. p. boiler, 20-h. p. engine and No. 4 Connorsville blower. About 25 men are employed, normally. Production was 550,000 lbs. fine copper, in 1908. The smelter went out of blast in 1910 and is still idle, but management hopes to resume production shortly.

TAMBORAQUE; FUNDICIÓN DE.

PERU

Owned by Lizandro A. Proaño, at San Mateo, Lima, Perú

TANALYK CORPORATION, LTD.

RUSSIA

London manager and secretary, and office: J. P. Webster, 80 Bishopsgate, London, E. C., Eng. Mine office: Tanalyk, Orenburg Government, Russia. Leslie Urquhart, chairman; Baron V. V. Meller-Zakomelsky, T. Blair-Reynolds, R. Gilman Brown, V. V. Romanoff, Capt. H. A. R. Scott, directors. Organized April, 1912, under laws of Great Britain, capitalization £300,000, shares £1 par; fully issued and fully paid, to acquire entire share capital of the South Urals Mining & Smelting Co., organized under the laws of Russia.

Property, 22 mining claims in Orenburg Government, 9,590 acres, held on 70-year lease, and timber rights, expiring 1931, on 300,000 acres of forest. In addition has exclusive prospecting rights over 3,000 sq. miles with rights to take up further 17,000 acres of mining claims.

The 5 copper deposits now being developed have sulphide ore averaging 7% copper, 1 oz. gold and 5 oz. silver. Certain ores also contain zinc in payable quantities and experiments are being made for separation of this metal before final reduction plant is decided upon. Reverberatory furnaces to treat the less zincy ores are now building and should be in operation in

1914. There are also valuable gold quartz veins which are now being developed, besides large deposits of manganese.

An experimental smelter of 550 tons monthly capacity was started in July, 1913, and proving satisfactory, a new smelting plant to handle 7,500 tons is planned.

It is reported that the capital of the company is to be raised to £450,000 by the creation of 150,000 additional shares and that an issue of £200,000 in 6% convertible bonds is to be made.

TANGANYIKA CONCESSIONS, LTD.

BELGIAN CONGO & RHODESIA

Office: Friars House, New Broad St., London, E. C., Eng. Mine offices: Kambove, Katanga, Belgian Congo, and Kansanshi, Northwestern Rhodesia; Tyndale White, chairman; Robt. Williams, managing director; John Wm. Broomhead, Lord Arthur Butler, T. P. Heyvaert, Thos. Honey, Sheffield Neave and C. F. Rowsell, directors; L. Scotland, sec.; Robt. Williams & Co., mgrs. and engrs.; Allan Gibb, chief engr.; Thos. Bayne, engr.; F. E. Studt, geologist; A. G. Keith, Rhodesian agt.

Organized Jan. 20, 1899, in Great Britain, capitalization £1,000,000. Original capitalization was £100,000, successively increased Dec. 1901, to £184,000, in 1902 to £194,000, in 1903 to £264,600, in April, 1905, to £450,000, in July, 1905, to £525,000, and in Nov., 1906, to present amount; shares £1 par; issued, 944,098, May 30, 1913. Debentures £2,600,000 authorized, at 5%, in denominations of £8; outstanding £2,241,823, including further interest account, May 30, 1913. Col. Sir Howard Melliss, K. C. S. I., and Hon. Arthur Stanley, M. P., are trustees for the debenture holders. The debentures are redeemable at par Jan. 1, 1917, or at option of the company on 6 months' notice, after Dec. 31, 1911. Interest paid in cash.

The property of the company, Sept. 30, 1912, consisted of a 50% share interest in the Compagnie Union Minière du Haut-Katanga amounting to 50,000 shares of f100 par and 48,000 dividend shares; 75% of the issued stock of the Rhodesia-Katanga Junction Railway & Mineral Co., Ltd., amounting to 500,750 ordinary £1 shares, 44,500 "B" 1s. shares, the Kansanshi copper mine having been sold to this company; 1,600 shares of f250 par in the Compagnie du Chemin de Fer du Katanga; £2,700,000 stock and £334,300 5% bonds of Companhia do Caminho de Ferro de Benguela; 2,297 shares of £4 each of the Intertropical Anglo-Belgian Trading Co.; 51,853 shares of fully paid £1 shares and 19,996 shares of £1 par, 1s. paid, of the North Zambesia Concessions, Ltd., and £5,000 of the 3% debentures of the Rhodesia Railways, Ltd.

The Tanganyika Concessions, Ltd., has an arrangement with the Zambesia Exploring Co., Ltd., by which the latter is ready to finance the former until the company is independent. The Zambesia Co. has practically the same officers as the Tanganyika, and floated the latter, the former having a capitalization of £700,000, shares £1 par, with 666,855 shares issued, fully paid, and an authorized debenture issue of £250,000, secured by 100,000 shares of Tanganyika. The Zambesia Exploring Co., Ltd., paid a 100% dividend Feb. 7, 1896, and for the year ending June 30, 1912, showed a profit of £13,468. The accounts for the year ending Sept. 30, 1912, submitted May, 1913, show a loss of £136,116 compared with loss of £226,787, for 15 months ending on like date 1911, both amounts being deducted for share premium account.

This company was formed to acquire from the British South Africa Co. a 2,000-acre concession in Northern Rhodesia for a terminal and town site of the Cape to Cairo railway at the S. end of Lake Tanganyika; a 2-year exclusive right to prospect and locate for minerals in an area of 2,000 sq. miles

N. of the Zambesi and to locate 1,000 claims in B. S. A. territory. For these concessions, the company gave £60,000 in fully paid shares, besides which the B. S. A. Co. retains a 35% interest in all mines. Having made important discoveries and located various mines in the borderland of the Belgian Congo, the Tanganyika sought and obtained another mineral concession, covering 60,000 sq. miles of the Belgian Congo region, known as the Katanga, and adjacent to the Rhodesian properties of the company. The Special Committee of Katanga reserved 60% of the net profits and received £30,000 in fully paid shares. An extension of this concession and an interest in the Benguelle railway later increased to 90%, was acquired in July, 1902, for £10,000 in fully paid shares.

The mineral discoveries in the Belgian Congo cover a copper belt 200 miles long with over 100 known copper deposits; also a tin belt, 110 miles long, with workable deposits; also gold and iron mines and diamondiferous areas.

The Tanganyika Co. has sold its holdings to subsidiary companies controlled by it and thus becomes a parent holding company only. In the Belgian Congo, 72 large mining concessions were located, the company engineers estimating 1908, that 5 of these claims showed 9,500,000 tons of 6.3 to 14% copper ore, most of which could be extracted opencast, while on another group, the company estimated 1,500,000 tons in sight, of 13% copper tenor.

The copper interests of the Tanganyika Concessions, Ltd., consist at present almost exclusively of its holdings mentioned above in the Union Minière du Haut Katanga and the Rhodesia-Katanga Junction Railway & Mineral Co., Ltd. (Kansanshi). The copper deposits and mines owned by the Union Minière were discovered by prospectors employed by Tanganyika Co., under the terms of the concession from the Comité Spécial du Katanga. These deposits are scattered through a practically uninterrupted belt of country extending from the Rhodesian border in the S. E. corner of the Katanga region to the W. bank of the Lualaba river, a distance of 180 miles in a N. W. and W. direction. This copper belt is a region of rounded hills and steep sided valleys, 4,000 to 5,000' above sea level, the copper areas being bare, due to copper salts. The copper ores occur in sandstones and in schists, slates and limestone, the beds running W.-N. W. and dipping steeply. The ores are oxidized, malachite being the most abundant mineral associated with chrysocolla and azurite, while melaconite is found mixed with wad. The orebodies are lenses that vary from small deposits up to mammoth ones such as Kambove No. 2, said to be 3,000' long, 240 to 400' wide and to hold 10,000,000 lbs. of 15% copper ore to a depth of 100'.

The Star of the Congo mine, in the Belgian Congo, was the first to be reached by the railway extension from Broken Hill in Rhodesia and the first to be developed and worked. Development work at this mine comprises 20 shafts, a total of 1,250', about 3,000', of crosscutting and a main haulage tunnel open at each end, driven 1,500' through the deposit, at a depth of 80 to 90', or just above water level. This tunnel is equipped with rope haulage and a double track for ore trucks.

The deposit is being mined by opencuts, the ore after breaking being milled down through winzes to the crosscuts below and hauled out through the main tunnel to the surface. The rich ore goes direct to the smelter, but the bulk is washed, sorted and concentrated before it is sent to the furnace.

The Lubumbashi smelting works are 8 miles from the mine on the main railway line. The plant contains two 48x192" water-jacket blast furnaces, smelting about 4,000 tons of ore monthly. During 1911-12, the furnace was in blast for 3 smelting campaigns, aggregating 228 days, and

treated nearly 30,000 tons of 12 to 15% ore in a single furnace. The product was 3,000 tons of bar copper averaging 93% pure copper, obtained with a consumption of from 2.65 to 3.44 tons of coke per ton of copper. The second furnace was ready for work in Nov., 1913. The smelting work has been greatly handicapped by a shortage and the high cost of fuel, European coke costing £12 per ton. Coke is now being regularly supplied at the rate of 1,500 tons a month from the Wankies coal mines in Rhodesia, a distance of 725 miles on the main railway. This coke costs about £6 a ton delivered at the smelter, the colliery's entire coke output being bought by the Union Minière up to the end of 1913. A battery of 22 coke ovens is being built at the Lubumbashi works, which, at the end of 1913, will produce 1,200 tons of coke a month, costing about £4 a ton. The Wankies coal mines have contracted to supply the Union Minière with washed coal for 5 years at £6 6s. to £7 6s. a ton, with 2,000 tons minimum and up to 5,000 tons a month. A second battery of 22 coke ovens is to be erected when the first is finished.

The Kambove mine is the largest and most important copper mine owned by the Union Minière. It is 100 miles N. W. of the Star of the Congo and is now reached by the railway and can ship its ores to the Lubumbashi smelter. A 2-compartment haulage tunnel has been driven from the surface through the deposit for 1,500', half through payable ore. The tunnel is equipped with rope haulage and a double track. There are 10 shafts from 100 to 50' deep to the level of this tunnel and 5 bore holes put down to about 100' below tunnel level with about 1,600' of crosscutting. Ore will be quarried and milled through the shafts and hauled out through the tunnel. Management estimates 3,000,000 tons of 13.4% copper ore in sight above the tunnel level and a similar quantity of probable ore in the 100' below. The Kambove is situated 1,720 miles from the seaport of Beira, by rail, and is reported to be able to produce 500 tons of ore daily in 1913.

The Luiswichi and Luusha mines, 30 miles from the Star, have been developed recently and results being satisfactory, they will be equipped and worked, supplying ore to the Lubumbashi smelter.

On all the other deposits forming the copper belt varying amounts of prospecting and development work have formed the basis of estimates, some of which are as high as 300,000,000 tons of copper ore in sight over the whole copper belt.

The Bukama tin belt of the Union Minière is an area in the Katanga containing tin deposits on which development work was commenced in 1913. The belt is near Bukama, on the navigable Lualaba-Congo route from the West Coast, and 210 miles from Kambove, with which place it is being connected by rail, and should be working its valuable ores by the end of 1914.

The Kansanshi mine, transferred in 1909 to the company's subsidiary, the Rhodesia-Katanga Junction Railway & Mineral Co., Ltd., lies at an elevation of 5,000', about 12 miles S. of the Congo-Zambesia divide, which forms the boundary between Rhodesia and the Belgian Congo. This property shows extensive remains of ancient opencut workings, there being trenches and pits for a distance of 6,000', which form 6 chains or lines of workings, in which the pits vary from 1 to 30' in width, 5 to 30' in depth and 300 to 1,300' in length.

The Kansanshi copper deposits consist of beds, 1 to 10' thick, of sandstone impregnated with copper and resting on limestone and schist. The sandstone is micaceous and fissile in places and more or less charged with malachite particles and flakes, the upper beds carrying malachite and chrysocolla, with occasional occurrences of azurite and melaconite, and some cuprite, with silicious gangue, and some manganese dioxide in the superficial portions. The gangue carries a little limonite, usually ochrous. Sur-

face ores are said by Mr. John R. Farrell to show no evidence of having resulted from alteration of sulphides in place, the facts leading him to the opinion that the malachite was deposited from hot solutions, coursing in fissures. The ore is highly silicious.

The main ore bed, known as "D" reef, averages 8 to 10' thick, with 5 to 10' of sandstone impregnated with malachite on each wall of the vein; the ore as mined is said to average 18.7% copper with \$2 gold per long ton. Sulphide ores, with bornite and chalcopyrite associated with pyrite, show in the deeper workings, but the depth of the oxidized zone has not as yet been determined.

Development includes 5 shafts, sunk in old opencuts, on ledges or beds 1 to 16' thick. The main shaft, of 300' depth, is on "D" reef, which averages 8 to 10' wide and has been opened for a distance of 1,000', on the 85' level, and a second level, at 134'. The "E" reef, of 2 to 3' width, and another reef of about 4' width, have been opened for nearly 500' on the 85' level. An 8' vein with limestone walls is reported to average 10.5% copper on the 200' level.

The Kansanshi mine has produced up to May, 1913, 2,500 tons, or 5,600,000 lbs. of copper, smelted in a small blast furnace made at the mine and using charcoal as fuel. The transport of this tonnage cost about £6 per ton from Kansanshi to Baya, on the railroad.

The mine is being developed and a concentrating plant as well as extensive pumping machinery were installed, 1913. The property is 80 miles from the main railway and both ore and supplies are transported by traction engines.

The company's success in opening up a vast territory in Central Africa, building railways and developing great mining interests, has been very largely due to its energetic managing director, whose unbounded optimism has carried the company over difficulties that would have swamped a more conservative management. The company has, however, paid a good price for these services, the contract, 1905-11 securing Mr. Williams 10% of the net profits of the company's assets representing profits. The financial part of the company's affairs have also been much criticized on the ground of excessive royalties exacted amounting to 60% of the net output of the Belgian properties, while only 65% interest is owned by the company in the Rhodesian properties it has spent so much money in developing.

The company's subsidiaries are now producing about 12,000,000 lbs. of copper yearly, at a reported cost of 9.1 cts. per lb., but it will be many years yet before the world will be flooded with the copper produced in Central Africa, as was feared when the company was first formed. While the early statements issued greatly exaggerated the present conditions, and the results of 13 years' work and the expenditure of \$33,000,000, have not yet brought the company to a dividend-paying stage, it has demonstrated the worth of the properties. Great credit must be given Mr. Williams for his energy and perseverance in bringing this great enterprise to its present condition. The company has heretofore given out very little real information, especially about its financial affairs, but the tide having turned and the enterprise being now fairly under way, fuller reports will doubtless be given. The company still has the problem of treatment of the great silicious copper deposits to solve and the Benguela railroad to build, but these problems are not unsurmountable if money is available.

The remarkable development that has taken place in the Katanga copper country can be realized more fully perhaps when it is remembered that the European population at the Star and Elisabethville numbered 2 in 1907

and now number nearly 2,000, according to official returns from the Belgian Colonial office.

TARAPACÁ DE COLLAHUASI; COMPAÑÍA MINERA. CHILE

Idle. Office: Valparaiso, Chile. Mine office: Collahuasi, Tarapacá, Chile. Organized Jan. 10, 1906, under laws of Chile, capitalization £50,000, shares £1 par.

TARAPACA COPPER QUARRIES, LTD. CHILE

Secretary and office: E. T. Evans, Finsbury Court, London, E. C., Eng. Mines at Huiquintipa, Chile. R. H. U. Ellis, H. W. Whyte and J. S. Enright, directors. Organized Jan., 1912, as successor to the Copaquire Copper Sulphate Co., Ltd., capitalization £350,000, shares £1 par; issued, 30,007.

Lands, 25 claims, 50 hectares, in 2 groups. The Huiquintipa group of 13 claims, at Huatacondo, carries diopase and chrysocolla, these silicates of copper occurring as the cementing material in a conglomerate bed up to 85' thick. Company estimated 6,000,000 long tons of 3.25% ore exposed.

The Copaquire group shows granite country rock, carrying an abundance of oxidized copper minerals, mainly copper sulphates and sub-sulphates averaging 2.5 to 3% in copper tenor. The management of the former company stated that the deposits were natural bluestone, with some impurities mechanically mixed therewith, but, as a matter of fact, the ore consists of a mixture of 3 different salts, and is similar to that of the Chile Copper Co. at Chuquicamata. The old company's "experts" have estimated that the Copaquire deposits show upwards of 100,000,000 long tons of ore worth £20,000,000. Development is by a 150' shaft and about 1,000' of opencuts and trenches.

Equipment includes a 45-h. p. steam plant, warehouse, office and laboratory of stone, to withstand numerous and severe earthquake shocks. The lixiviation plant, covering about 1 acre, is rated at 500 tons daily capacity, with a dehydrator for drying crystals of bluestone. Mine and leachery are connected by a 4,000' tram line. Nearest railway is 70 miles distant, transport between being on the backs of mules, over rough mountain roads. Soft coal costs £8 15s. per ton delivered, but this price being prohibitive, yareta is burned mainly for fuel. This is a gigantic club-moss, having a lob of resin, a single cluster occasionally weighing more than a ton.

TARAPAQUENA DE CHAÑARAL; CIA. CHILE

Mine near Angostura, Atacama, Chile. Lands, 22 hectares, on the Chañaral railway, 10 kilometers N. of Angostura, with a good wagon road connecting with station. Equipment includes a number of wooden dwellings for workmen. No recent returns secured.

TARAWERA GOLD MINING & SMELTING CO. NEW ZEALAND

Mine at Otago, Otago Co., N. Z. C. E. Storie, consulting engineer. Capitalization £25,000. Lands, on Preservation inlet, carry several orebodies said to average about 4% copper, with gold and silver values worth more than the copper. A smelter, planned to do custom business, in addition to treating the ores of the company, was erected late 1910. No recent returns secured.

TASMAN & CROWN LYELL EXTENDED MINES, N. L. TASMANIA

Office: 31 Queen St., Melbourne, Aus. British office: Palmerston House, London, E. C., Eng. Mine office: North Mount Lyell, Montagu Co., Tasmania. T. C. Dunster, chairman; W. Coleman, Moss Marks, George Durham and A. Campbell, directors; John Brandon, sec.; Edwin Habben, London sec.; Edw. Carter, mine mgr. Organized March 21, 1907, under laws of Victoria, as a reconstruction of the Tasman & Crown Lyell Mining Corporation, N. L., capitalization £150,000, shares 10s. par, increased from £90,000 in April, 1913. Shares are listed on the London, Melbourne, Hobart

and Launceston stock exchanges. Half yearly meetings, April and October.

Property, 5 claims, 181 acres, leasehold, and mill and smelter sites, etc., 236 acres in all, covering the Mt. Lyell copper-lead belt for half a mile. The claims are 1 mile N. of the Mt. Lyell mine and 6 miles from Queenstown by tram.

The ore deposits occur in the Great Lyell fault which runs N.-S. and brings schist and conglomerate together. Ore shoots occur on the contact, running N. 60° E. and dipping 60° N. W., with ore carrying chalcopyrite and occasional bornite, galena and sphalerite, occurring as impregnations in schist, near a conglomerate contact. The silver-lead ores are of low grade and apparently of small promise, but are succeeded by copper ores at greater depth. The management estimated ore reserves at 35,000 tons, Sept., 1912, averaging 20% lead, 10% silver and 14% zinc. The pyritic lode carries 3¼% copper, 2 to 10 oz. silver and a few grains of gold. This orebody is 8' thick and 200' long, but extent and tonnage are unknown. Development is by a 270' shaft, and several prospect tunnels of 170' and 380'. The most extensive development is on the 3rd tunnel level, 1,610' long, cutting a 7' galena vein at 975', and at 1,443' the conglomerate was reached 270' vertically below the surface.

A 100-ton concentrator was finished, 1911. It contains ten 950-lb. stamps, 1 Wilfley, 1 Card and 6 Phoenix-Weir tables, besides canvas tables for slime; 649 tons of ore was treated giving 77½ tons concentrates carrying 56% lead, and 15.86 oz. silver per ton, with 44 ton middlings of 41.33% lead. Property considered quite promising.

TASMANIAN BALFOUR PROSPECTING ASS'N.

TASMANIA

Letters unclaimed at Mt. Balfour, Russell Co., Tasmania. Dr. Fritz Noetling, chairman; C. P. Smith, cons. engr. Capitalization £3,000, shares £1 par. Lands, 3 blocks, 200 acres, leasehold, showing a gossan carrying about 1.2% copper, with traces of gold and silver, capping a vein reported to be 80 to 100' wide, carrying ore assaying up to 12% copper, 10 dwts. silver and a trace of gold. Was developing with a small force at last accounts. Probably closed down.

TASMANIAN COPPER CO., LTD.

TASMANIA

Secretary and head office: A. Simson, 15 Patterson St., Launceston, Tasmania. London sec. and office: J. G. Coldwells, 348 Winchester House, London, E. C., Eng. Mine office: Rosebery, Montagu Co., Tasmania. Senator J. S. Clemons, chairman; E. M. King, B. Kelly and J. Barclay, directors; F. L. Cox, chairman and F. Clemons, members London Board; G. Barker, mine mgr. Organized Jan. 13, 1897, capitalization £325,000, shares £1 par; 324,210 issued. Debentures £30,000 authorized, at 10%, redeemable at 150; issued, £24,730. Accounts to Dec. 31, 1911, showed a loss of £4,502, increasing the debit balance to £29,936.

Property consists of the Rosebery mine, with 386 acres, on Mt. Black Bear, near the Stitt river, in the North Dundas district. The mine has an orebody that apparently is a replacement deposit, with a schistose footwall, along a line of fault fissuring, with an orebody reported as 5 to 50' wide, and carrying up to 22' of complex sulphide ore, averaging only about 0.5% copper, values being mainly in lead, gold and silver, with some sphalerite. This complex ore is difficult to treat.

Development, by tunnels, longest 644'. Ore reserves were estimated Aug. 31, 1912, at 250,000 tons blocked out above No. 6 level, with further reserves of 283,200 tons probable ore above the main adit level, 118' vertically below level No. 6.

In 1908, company sold its former holdings in South Australia, including

the Blinman and the Sliding Rock copper mines and other leases in the Leigh Creek district.

A contract has been made with the Tasmanian Metals Extraction Co. to treat the company's complex sulphide ore by the bi-sulphite process. They have built a large smelter $1\frac{1}{2}$ miles from the mine and have bought the entire output of the mine. Operations began in 1913. Production for 3 months, May-July, 1913, was 3,174 tons, netting £3,880.

TASMANIAN METALS EXTRACTION CO.

TASMANIA

Office: 21, Army and Navy Mansions, 115 Victoria St., London, S. W., Eng. Works office: Rosebery, Montagu Co., Tasmania. Sir Edw. Durand, Bart, chairman, E. H. Midgley, A. C. I. S., secretary. Organized June 26, 1908, under laws of Tasmania, capitalization £350,000, shares £1 par; 349,846 issued. Accounts to June 30, 1912, showed cash £383, investments £2,660, debtors £1,992, loans £3,148 and creditors £2,820.

Property is a 400-ton reduction plant, planned to treat the output of the Tasmanian Copper Co., Ltd. This ore is a complex sulphide, holding auriferous and argentiferous lead, zinc and copper and will be treated by the bi-sulphite process under license from the Metals Extraction Corporation. The reduction plant, erected $1\frac{1}{2}$ miles from the mine, on the Emu railroad, was started in 1913. The contract calls for payment for silver, gold and lead recovered, and for copper if above one-half per cent and this company hopes to save the zinc for itself.

TELEMARKEN COPPER MINING & SM. CO., LTD.

NORWAY

Formerly owned the famous Aamdal copper mines in Norway, now being worked by the Bandak Electrolytisk Kobbervaerk, and described under that title.

TENIENTE SMELTER.

CHILE

Owned by Braden Copper Co.

TERANO MINE.

JAPAN

Idle. Mine at Saretani-chime, Iyo, Iyo, Japan. Ore is chalcopryite, associated with iron pyrites, carrying 4 to 5% copper. Vein, traversing chloritic schist, ranges up to 7' width, with an average of 12 to 24". Production was 77,291 lbs. fine copper in 1911.

TERRE NEUVE MINING CO.

HAYTI

Address: care Henry R. Tippenhauer, 25 Broad St., New York. Mine office: Port au Prince, Hayti. Organized 1910, in Hayti. Property consists of copper-bearing lands at Terre Neuve, Gros Morne and Gonaives. Claims show a contact belt between limestone and igneous rocks of granitic texture, with contact metamorphic deposits having bornite and chalcopryite in a garnet gangue. There are also the usual oxidized ores and rich sulphides have been found in a few small fissure veins. Property has been examined by W. H. Weed.

TERREMOTO MINE.

BOLIVIA

Sr. Rodolfo Ameller, owner. Mine is in the province of Abarsa, has 40 hectares and produces 45 quintales, 9,920 lbs. copper monthly.

TERRY COPPER SYNDICATE, LTD.

TRANSVAAL

Office: 2 Bussey Bldg., Johannesburg, Transvaal. W. Ballantine, chairman. Organized under laws of Transvaal, capitalization £10,000. Property, the Farm Waterplaats, and a year's option, at £6,000, on the adjacent farms Lucasrust and Kopermijn, the 2 latter farms having an area of approximately 2,000 morgen. The mine had a 90' shaft, with several short drifts, at last accounts.

THARSIS SULPHUR & COPPER CO., LTD.

SPAIN

Office: 136 West George St., Glasgow, Scotland. Mine office: Alosno, Huelva, Spain. Works offices: Hebburn-on-Tyne, Durham, Eng.; Willing-

ton, Northumberland, Eng., and Cardiff, Glamorganshire, Wales. Lord Glenconner, chairman; Etienne M. Chalvet, Albert J. J. Messéan, Hugh Brown, Louis O. Schmidt, René Millet, Thos. Alexander, Jas. Couper and Wm. P. Rutherford, technical mgr., directors; Geo. Reid, sec.

Organized Oct. 27, 1866, under laws of Great Britain, capitalization £1,250,000, shares £2 par. Dividends, begun 1868, have been paid since, without the lapse of a single year, this dividend record being comparable, among copper mines, only with that of the Quincy Mining Co. of Michigan. The dividend disbursements have averaged 19% per annum since 1868, and, to the end of 1912, aggregated 868 1/6%, amounting to the magnificent total of £9,758,432, putting this company well to the front among the profitable mines of the entire globe. In addition to dividend disbursements, the company has written off sums aggregating £2,518,056, and on Dec 31, 1912, had £1,161,805 in cash and choice securities. Net profits of operations have ranged from a minimum of £27,052 in 1868, to a maximum of £478,878 in 1899, with £225,135 in 1905, £315,147 in 1906, £261,023 in 1907, £137,377 in 1908, £162,743 in 1909, £161,211 in 1910, £188,140 in 1911 and £253,066 in 1912.

Lands include the Tharsis group, 1,143 hectares, the Lagunazo group, 271 hectares, near Alosno, about 30 miles W. of the Rio Tinto mine, and the Calañas or Zarza group, 618 hectares, near Calañas, and midway between the Tharsis and Rio Tinto mines. The mines at Tharsis, worked by the Romans and probably by the Phœnicians before them, are identified by some with the Tarshis of the Bible. General geological conditions are much the same as at the Rio Tinto, the mines being in the southern zone of the Andevalo or Sierra Morena district of Huelva. The Tharsis group carries 4 main orebodies, having a generally S.-E. strike. The largest orebody is the Filon del Norte, at the N. E., having an extreme width of 140 meters and length of about 600 meters. The Filon de Sierra Bullones nearly adjoins the Filon del Norte, with a similar general trend, and the Filon del Centro, or Filon del Medio, is next in line, and is succeeded by the Criadero del Sur, the most southerly of the orebodies. The company also owns the Almagrera mine, about 1 mile S. E. of the center of the Tharsis group.

Systematic deep development of the Calañas mine, completed 1912, has developed between 6 and 7 million tons of copper-sulphur ore now being prepared for extraction. The depth of the orebody is still undetermined.

The North lode, unworked for many years, is being explored, 1913, as the ores, though low in copper, can be worked for sulphur.

The Lagunazo mine has not been a copper producer, except from old leach heaps, for some years, but shows a large quantity of ore rich in sulphur, though low in copper. There are large quantities of partially leached ore at the Lagunazo mine which continue to yield a fair quantity of cement copper.

The ore of all of the Tharsis mines is a massive cupriferous pyrite, formerly averaging about 3% copper, 50% sulphur and 45% iron, with very small quantities of gold, silver, lead, zinc, nickel, bismuth, antimony and arsenic, but with increased depth the copper percentage is decreasing. The mines, however, far from being exhausted, show enormous reserves of ore, low in copper, but of excellent sulphur tenor, and decidedly profitable, notwithstanding the decrease in copper values. In 1912, production was 33,480 long tons of ore from the Tharsis mines and 318,801 tons of ore, with removal of 169,727 cu. m. of overburden, from the Calañas mines, giving a total extraction for the year of 352,281 tons of ore, as compared with 327,348 tons of ore mined in 1911.

A part of the ore extracted is piled in heaps, from which the copper is

leached by systematic sprinkling, the leach water going to creosoted timber sluices, where the copper in solution is deposited on pig iron, and the precipitate sacked for smelting. Some of the older workings are flooded, and the mine water is pumped and leached for copper contents in the same manner as the leach heaps.

The company owns a private railway, of 4' gauge, an 18-mile branch connecting the mines at Calañías with the Tharsis group, and the main line of 29 miles runs from Tharsis to the port of Corrales, opposite Huelva, on the Río Odiel, where there is a shipping pier. The line is well equipped with rolling stock and is kept modern and efficient by frequent renewals.

The company owns extensive works at various points, including a wet process plant and refinery at Hebburn-on-Tyne, and other plants at Willington-on-Tyne, Cardiff, and Glasgow.

Owing to the declining copper tenor of its principal Spanish orebodies, the company has been endeavoring, for some years past, to secure new mines, in order to maintain its copper production, and to that end has investigated properties in many countries. The company held 2 contiguous properties at Mammoth, Pinal Co., Ariz., 1908-09, but abandoned same. Other properties are being investigated in Norway, but no new mines have as yet proven satisfactory. Production was 24,968,280 lbs. fine copper in 1898, 15,025,920 in 1902, 12,588,800 in 1904, 12,590,266 in 1905, 10,617,600 in 1906, 9,878,400 in 1907, 9,796,480 in 1908, 9,799,680 in 1909, 7,826,560 in 1910, 7,600,320 in 1911, and 7,564,480 lbs. in 1912. The record of this company is one of the very best ever made by any copper mine.

THELMA SYNDICATE, LTD.

NORWAY

Secretary and office: J. A. Stocker, 4 Broad St. Place, London, E. C., Eng. A. Dickinson, W. J. Payne, F. E. Elmore and J. A. Stocker, directors. Organized under laws of Great Britain, Oct. 22, 1910, capitalization £7,000, shares £1 par; all issued and fully paid. Debentures, £2,000 authorized, £1,450 issued.

Company is a private one in which the Ore Concentration Co., Ltd., is interested and was formed to treat the tailings and part of the crude ore of the Sulitelma and other copper properties in Norway, by the Elmore vacuum process. The payments are on a sliding scale dependent on amount of concentrate.

THOMAS; GEWERKSCHAFT DER GRUBE.

GERMANY

Mine office: Bergebersbach, Hessen-Nassau, Germany. Ludwig Heise, gen. mgr.; Eduard Speis, supt. Employs 15 men. Mine, in the development stage, has 2 tunnels, showing silver-lead, copper and zinc sulphides. No returns secured.

THORN'S FIND MINE.

QUEENSLAND

At Georgetown, 20 miles from Teasdale, on the Forsayth railroad, Queensland, Aus. J. H. Barnes, owner; Dan Thorn, discoverer and superintendent. Developed by a 10' pit, 1913, showing rich copper ore. A shipment to the Chillagoe smelter returned over £5 per ton, exclusive of all charges, including 45 miles teaming to Einasleigh.

TIERRA AMARILLA SMELTER.

CHILE

Owned by Sociedad Industrial de Atacama, Chile.

TINSJÖ KOBBERMINER; AKTIESELSKABET.

NORWAY

Idle. Office: Christiania, Norway. Mine office: Hovin, Telemarken, Christiansand, Norway. The mine has produced small quantities of ore assaying about 20% copper and 0.1% silver.

TINTO y SANTA ROSA; SOCIEDAD DE LAS MINAS

DE COBRE.

SPAIN

Office: 1 Rue Archimedes, Brussels, Belgium. Mine at Zalamea la Real,

Huelva, Spain. Capitalization 3,000,000 francs. Lands, 114 hectares, including El Tinto, Santa Rosa and 9 other old mines. Property includes a 7-kilometer aerial tram to Calañas, and has been under lease to the United Alkali Co., Ltd., for some years past.

TOCOPILLA; SOCIEDAD BENEFICIADORA DE. CHILE

Office: Valparaíso, Chile. Works office: Tocopilla, Antofagasta, Chile. Organized Sept. 7, 1906, under laws of Chile, capitalization £200,000, later reduced to £180,000, shares £1 par. Is controlled, through ownership of 80% of the issued stock, by H. D. Sloman. Company bought 1909, the mining properties of the Anglo-Chilian Nitrate & Railway Co., Ltd.

Lands, 520 hectares, near the port of Tocopilla, include the San Juan, Altamira, San Carlos, Feliciano, Colorado and Buena Vista mines, taken over from the Anglo-Chilian Co., also the Deseada, San José, Percance, Janequeo and Abandonada mines, all old properties, worked more or less in the past, and now in process of rehabilitation. Holdings and reduction plant fully described, Vol. X.

TOLAR DE COLLAHUASI; SINDICATO MINERO EL. CHILE

Is presumably the Chilean holding company for the Tarapaca Copper Quarries, Ltd., and property described under latter title.

TOLOSA; SOCIÉTÉ ANONYME MINES METALLIQUES DE. SPAIN

Probably dead. Office: Monceau les Mines, France. Mines at Leiza, Navarra, Spain. Capitalization 715,000 francs, 500 francs par. Property comprises lead-copper mines at Navarra, including the Regina, partially prospected.

TOLWONG MINERAL CO., LTD. NEW SOUTH WALES

Mine office: Bungonia, Argyle Co., N. S. W., Aus. Organized 1906, capitalization £6,000, shares 2s. par. Property, 250 acres, well timbered and watered, on the Shoalhaven river, carries an 11' vein, traceable 4,000'. This is opened by several shallow incline shafts developing stannite ore, said to average 10% copper, 8% tin, 15 to 30% arsenic and up to 3 oz. silver, with small quantities of zinc and lead and a trace of gold.

Equipment includes a 115-h. p. steam plant, with electric power and light. There are 2 aerial trams, 1 of 2,720' length, with elevation of 1,030' connecting the mine and smelter.

The smelter, built 1910, has a crushing plant and a reverberatory furnace, with electric power, and is planned to make tin-copper matte in 2 fusions. Property is decidedly interesting, but ore extremely difficult and costly to treat.

TORNERHJELM MINE. NORWAY

Owned by Sulitelma Aktiebolag.

TRAFALGAR MINE. QUEENSLAND

Owned by Mt. Elliott, Ltd. Developed by 2 shafts, 100' and 140' deep, 1913, sunk on well defined vein. Driving to connect these shafts has commenced. Ore averages 10% copper and mine considered very promising.

TREKELANO MINES. QUEENSLAND

Owned by Hampden Cloncurry Copper Mines, Ltd. Developed by 80' shaft, showing ore averaging 8 to 25% copper. A main shaft is being sunk to 250', management planning to develop on the 200' level. Equipment includes Cornish boiler and winding engine.

TRESAVEAN MINES, LTD. ENGLAND

Secretary and office: Aikman & Glen, 121 St. Vincent St., Glasgow, Scotland. E. S. King & Co., operators, Lanner, Cornwall. T. E. Lander, chairman; F. L. McLeod, R. T. Moore and J. M. Barbour, directors. Organized Jan., 1907, in Scotland, capitalization £150,000, shares 110,000 preferred and 40,000 ordinary, £1 par; issued 77,012 preferred and all ordinary.

Property is an old copper and tin mine that has been unwatered and systematically developed. The new work will be mainly on the Caddy's lode. It has a 3-ton steam hoist and the old 250-kw. generator is used to drive the compressor. Property examined and reported on by Dr. R. T. Moore and Capt. J. Paull, 1911.

TREUPEL; BERGWERK FR. D.**GERMANY**

Mine office: Herborn, Hessen-Nassau, Germany. Fr. D. Treupel, owner; Carl Treupel, supt. Lands, 70 claims, opened by shafts and tunnels, developing iron and copper ores.

TREVEDDOE MINING CO., LTD.**ENGLAND**

Office: 13 Throgmorton Ave., London, E. C., Eng. Col. Wm. F. Leese, chairman; R. Arthur Thomas, engr.; Wm. H. Adams, sec. Organized Aug. 13, 1900, under laws of Great Britain; capitalization £100,000, shares £5 par; issued £95,000. There are £10,000 of 5% debentures, and £7,500 of 5% prior lien bonds, authorized, with £6,100 issued, interest being several years in arrears.

Property, the Treveddoe tin and copper mine at Warleggan, Bodmin, Cornwall, 500 acres, held under a 100-year lease, subject to rental and royalty. Production was 60 tons of black tin and 175 tons of 7% copper ore in 1902. Operations for some years past have shown yearly losses, and the company seems likely to go into liquidation.

TSUBAKI MINE.**JAPAN**

Mine at Nishitate, Akita, Ugo, Japan. Kyosaku Takeda, owner and manager. Equipment includes steam installations aggregating 3,088 h. p. and 665 kw. electric power. Employed an average of 2,003 persons and produced 1,025,693 oz. silver, 532,852 lbs. copper and \$14,241 in gold in 1911 and 364,624 lbs. copper in 1912.

TUCO-CHEIRA; SOCIÉTÉ DES MINES DE.**PERU**

In liquidation. Office: 5 rue du Helder, Paris, France. Mine at Tuco-Cheira, Peru. A. Boscher, chairman; F. Maroni and P. d'Araujo, directors. Organized 1905, under laws of France, capitalization 3,750,000 francs, shares f250 par. Property, 2 groups, carrying copper and lead ores, and coal. Equipped with 75-ton matting furnace. Company will be reconstituted as soon as the railway to Recuay is finished.

TUMBY BAY COPPER MINING CO., N. L.**SOUTH AUSTRALIA**

Address: Tumby Bay, Flinders Co., S. A. Mine is 4 miles from the town and shows 2 veins, about one-half mile apart. The Tumby lode is reported to be 15" wide, trencched for one-fourth mile and proven to depth of 107', wholly in oxidized ore. The vein dips steeply S. and consists of quartz gangue with oxide and carbonate ores, malachite and azurite being most frequent. The Sack, a new shaft, 107' deep, was sunk in 1912. One shipment returned 11.20% copper. Property is an old one opened by several shallow shafts and trenches about 1867, when it was known as the Wheal Bessie mine.

TURNSTREAM COPPER MG. & DEV. CO.**CAPE PROVINCE**

Idle. Office: East London, Cape Province. Mine office: Cathcart, Cathcart Co., Cape Province. Organized June, 1907, capitalization £30,000, working capital £10,000, as successors of Turnstream Copper Syndicate. Lands, 16 miles from Cathcart, on the Zwart Kei river, have 4 veins, on 1 of which a 40' shaft has ore averaging 12.55% copper. No returns secured.

TWEETFONTEIN MINE.**CAPE PROVINCE**

Owned by Namaqua Copper Co., Ltd.

UGURCHAISKA MINE.**RUSSIA**

Office: Batum, Russia. Mine office: Zangezhur, Elizabetopol, Russia. Kunderov Bros., owners; G. Chaimazadi, mgr., at last accounts. Lands,

15 miles N. of the Arax river, which is the Russo-Persian boundary line, have a number of veins in diabase, frequently faulted and very erratic in occurrence, of 1 to 2 meters width, showing paystreaks of only about 8" average width, carrying covellite, bornite and chalcopyrite, latter predominating.

The mine has a shaft, but is developed mainly by winding, inclined tunnels having laterals and openings on the orebody with benched floors, the lower part serving as a sump, from which water formerly was carried to surface in leather buckets. Notwithstanding this archaic manner of development, the mine is opened to about 350' in depth.

The hydro-electric power plant has a turbine wheel, taking water through a canal from the Ochtchy Tschai river, with a generator giving a 500-volt current at 80 amperes. There is 1 electric hoist and an electric light plant.

The smelter employs preliminary heap roasting, after which ores are matted in 2 small water-jacket blast furnaces, burning charcoal and coke, brought from Evlach, with haulage charge of £5 per ton. Matte is collected in settlers and transferred to Manhes converters, turning out black copper, which is refined in reverberatories. Production was 350,000 lbs. fine copper in 1902, 450,000 lbs. in 1903, 650,000 lbs. in 1906, 700,000 lbs. in 1907, 435,000 lbs. in 1909. No recent returns secured.

UMKONDO MINE.

RHODESIA

Owned by South African Copper Trust, Ltd.

UNDALS VÆRKS NY INTERESSENTSKAB.

NORWAY

Office: Trondhjem, Norway. Mine and works office: Undal, Birkaaker, Norway. H. F. Klingenberg, pres.; A. H. Bachke, vice-pres.; Henry Banck, treas. Organized Aug. 28, 1888, as a reconstruction of a previous company, under laws of Norway, capitalization of 97,200 kroner, shares 400 kroner par, fully paid.

The mine, discovered A. D. 1650, has been opened on several occasions, and worked on a small scale. The ore is slightly cupriferous pyrite, low in copper tenor, and carrying about 44% sulphur. The mine has been idle some years, awaiting the advent of a railway, and the management plans beginning shipments 1916, when the railway will be completed to the property.

UNDERLAY MINE.

NEW SOUTH WALES

Idle. Mine office: Dandaloo, Narramine Co., N. S. W., Aus. J. Dunwell, owner and manager. The mine, discovered 1903, adjoining the Mount Royal mine, in Kennedy county, about 16 miles N. W. of Dandaloo, has a 5' vein, carrying silicious oxidized and sulphide copper ores, ranging up to 40%, developed by shafts of 150' and 200'.

UNION CONS. COPPER MINES (1911), LTD. SOUTH AUSTRALIA

Local offices: 75 King William St., Adelaide, S. A. Secretary and office: H. F. Spiers, 190 Dashwood House, London, E. C., Eng. Mine at Umberatana, Lyndhurst, S. A. T. Haydon, A. Goddard, J. Calder, H. Greenhalgh and F. Taylor, directors. Organized Sept., 1911, as successor of the Union Consolidated Copper Mines, N. L., and the Lyndhurst (South Australia) Copper Co., Ltd. Capitalization £150,000, shares 5s. par.

Property, 680 acres, at Umberatana, about 70 miles from Lyndhurst station, includes the Daly and Lyndhurst mines. The Daly property shows a great reef of quartzite, forming the crest of a N. W.-S. E. ridge, for one-fourth mile, that is stained with copper ore. This mass of shattered quartzite shows argillaceous seams with concentrations of high-grade ore, but not enough development had been done at last report to determine its actual value or to warrant the large ore reserves claimed by company.

The Daly mine has numerous shallow shafts, the deepest apparently but 250'. The company has claimed a width of 400' for the vein and a length of 1½ miles, but according to report, it shows but 10 to 20' of workable width in which impregnations of carbonate ore in tiny specks average 4 to 6% copper with small gold values. Company claims 7 veins and reports that the reserves blocked out in these veins average 13% copper. The Lyndhurst lode is said to carry 3% ore. In 1912 the company was working the mine on a modest scale, but not producing ore.

The smelter at the mine has a 100-ton water-jacket blast furnace, installed in 1910. Management estimates 2,000,000 tons of ore blocked out.

UNION MINIERE DU HAUT-KATANGA. BELGIAN CONGO

Office: 7 Montagne du Parc, Brussels, Belgium. Works at Elizabethville, Katanga, Belgian Congo. Baron F. Baeyens, chairman; Robt Williams, vice-chairman; Baron de Moor, managing director; H. Buttgenbach; J. Jadot, J. Cornet, Lord Arthur Butler, Tyndale White, Sheffield Neave and C. F. Rowsell, directors; Geo. Velge, sec.

Organized Oct. 28, 1906, under laws of Congo Free State, capitalization £400,000, shares £4 par; increased May 10, 1912, to £500,000, by issue of 25,000 new shares, fully paid. There are also 125,000 dividend shares without nominal value. Debentures, £800,000 authorized, at 4½%; issued £600,000. Is controlled, through half ownership each, by Tanganyika Concessions, Ltd., and Société Générale de Belgique. Annual meeting, first Monday in December.

Lands are very extensive, the concession comprising a copper belt about 200 miles long containing upwards of 100 exposures of copper and a tin belt nearly 100 miles long N. of the Kafue and Zambesi rivers, in the southern part of the Katanga, a rolling country with a fairly healthy climate. Company also owns valuable water power rights. The copper properties show sandstone carrying malachite impregnations. Company reports having prospected 10 mines sufficiently to warrant an estimate of 10,000,000 tons of 10% copper ore in sight and, in the tin belt, claims to have developed a large tonnage of 1% cassiterite ore.

The Star of the Congo mine was estimated, June, 1913, to have ore reserves of 1,300,000 tons averaging 5% copper, above water level. Development work below this level is in progress.

The Kambove No. 2 mine has 2 shafts, "H" and "I," which, at last accounts, were about 100' each in depth, but probably have been deepened, and crosscuts were said to prove an orebody of 200' width. This mine was estimated, June, 1908, to carry 9,000,000 long tons of ore, with 3,000,000 long tons in sight, averaging 12% copper. This estimate, on the strength of very limited and rather amateurish development, is considered grossly inflated.

In addition to copper properties, the company owns promising tin mines, these including the Busanga mine, which has payable stream-tin deposits, in alluvium of 3 to 10' thickness, estimated to show 3,000 tons of tin. The Kasonso and Chienzi mines have lode-tin deposits but apparently are but slightly developed.

The company also owns the Ruwe gold mine, which has an orebody of 9 to 14' width, opened for a quarter mile by several shallow drifts, deepest only 100', vein being a sandstone reef carrying gold up to 9 oz. 7 dwts. per long ton, and claimed to average 5 dwts. gold and 9 dwts. platinum, with occasional palladium, gold being quite coarse. The platinum figures seem to lack substantiation. The Ruwe mine also has a placer deposit, estimated to carry 20 oz. gold per long ton, from which some production was secured, at an average claimed cost of only 12s. per ton. Apparently the Ruwe

placer is nearly or quite worked out. The mine is credited with a production of 650 kgs. gold, but is idle at present for lack of transportation facilities.

In addition to ores of copper, tin, and gold, and claimed deposits of platinum and palladium, the company has an iron ore deposit, apparently of promise, near Shamerenga, on the Lualaba river, and a coal seam which is said to have been prospected to depth of about 300'.

The Lubumbashi smelter, 10 miles from the Star mine, has a 200-ton blast furnace, making ingot copper of about 95% purity and a second furnace is being installed which will be in commission by 1914. A briquetting plant, of 250 tons daily capacity, was added 1913, and a Coppee coking oven of 3,000 tons capacity, was being installed. Utilization of electrical power in smelting operations is under consideration.

Like its relative, the Tanganyika Concessions, Ltd., much misinformation has appeared in the press regarding the property, and the statements have been uniformly exaggerated.

The company does possess valuable mining properties, but investors are cautioned to secure information direct from the company officials and not to place reliance on current newspaper and magazine reports. See account of Tanganyika Concessions, Ltd., in this book and in Vol. X.

UNITED AFRICAN EXPLORATIONS, LTD.

ENGLAND

Secretary and office: Mack & Palmer, 1 Broad St. Avenue, London, E. C., England. Owns shares in Esperanza Copper & Sulphur Co., Huelva, Spain, and in various rubber, gold and oil companies elsewhere.

UNITED ALKALI CO., LTD.

SPAIN

Office: 30 James St., Liverpool, Eng. Mine office: Valverde del Camino, Huelva, Spain. Works office: St. Helens, Lancashire, Eng. John Brock, chairman; E. K. Muspratt, vice-chairman; Eustace Carey, sec.; J. H. Cresswell, gen. mgr.; C. Kaesmacher, asst. mgr.; Alex. Hill & Stewart, cons. engrs. Organized under laws of Great Britain. capitalization £8,750,000. Net earnings were £362,244 in 1908, from which £133,746 was disbursed for interest on debentures.

The company is primarily a chemical and manufacturing corporation, copper mining being merely a small branch of its business, which embraces 46 subsidiary works and corporations, some of the plants of very great size. The company has its principal works at St. Helens, Runcorn, Flint, Widnes and Glasgow, making extensive use of Spanish and Portuguese pyrites, which are burned for sulphur, after which the cinder remaining is leached for copper.

The company's copper properties in Spain include the Sotiel Coronada mines; also the Castillo del Buitron mines, held under lease from the Compañía del Ferrocarril y Minas del Buitron; the Cabezas del Pasto mines, held under lease from the Sociedad Colectiva C. y J. Sundheim, and Tinto and Santa Rosa mines, all in the province of Huelva. The Monte Rubio group was abandoned, 1909. These properties show typical Huelvan slates, carrying lenticular contact deposits between slate and porphyry, having a generally N.-W. strike, with dip from 30° to vertical, carrying cupriferous pyrite.

The Sotiel Coronada mine, 666 hectares, produces cupriferous pyrite ores and cement copper equivalent to an annual output of about 1,000,000 lbs. fine copper.

The Cabezas del Pasto group of 6 mining concessions, 104 hectares, includes also 300 hectares of adjoining lands, having lenticular orebodies, apparently increasing in size with depth, opened by 12 shafts, deepest 104 meters, with 6,000 meters of workings 1908, estimated to show 750,000 tons of fully developed pyritic ore, and 1,500,000 tons of cupriferous schists.

Extraction is underground, which is said to be both safer and cheaper than opencast operations, and mining is by overhand stoping, with dry walling and rock filling for depleted stopes. The Cabezas del Pasto ores carry 1.5 to 5% copper and 40 to 52% sulphur. The cupriferous schists range from 0.25 to 30% copper tenor. All pyritic ore above 1.5% copper, and all schists better than 10% in copper tenor, are exported, the low-grade ores being leached at the mine, and washed sulphur ore exported. The mine water carries up to 9 kgs. copper per cubic meter and is leached, the cement copper being washed and classified, the best quality averaging 98.5% copper, which is the highest grade precipitate produced anywhere. The surface plant of the Cabezas del Pasto includes a Robey hoist and pump, and the mine is served by a tramline of 36-cm. gauge, connecting with the company's private line, also by an aerial tram leading to wharves at La Laja, on the Rio Guadiana.

The Castillo del Buitron property is a group of 4 concessions, 47 acres, at Zalamea La Real, and includes La Poderosa group of 6 hectares, adjoining, and the Concepción mine of 6 hectares, at Almonáster. The Castillo del Buitron group has 2 principal lenses of ore, these being the Levante, with a length of 150 meters, but of decidedly irregular outline, and the Poniente, about 200 meters long. Production of this group averages 1,500,000 lbs. fine copper yearly.

The Tinto & Santa Rosa group includes La Santa Rosa and El Tinto mines, having a combined area of 141 hectares, at Zalamea La Real, leased from the Sociedad de las Minas de Cobre Tinto y Santa Rosa. The Santa Rosa mine has 2 parallel lenses, with 7 levels opened, and the Tinto mine has ores said to average about 1.5% copper and 46% sulphur. The group has 9 shafts, and was estimated 1908, by the Spanish government, to have 1,500,000 metric tons of ore developed. Production from this group was 38,005 long tons of pyrite and 803 long tons of cement copper 1905, and 58,181 metric tons of ore in 1908, and present production is estimated at about 2,000,000 lbs. fine copper yearly. These properties have a 9-kilometer Bleichert aerial tram to Calañas.

The company controls the Ferrocarril del Buitron of 42" gauge, of 79 kilometers length, running from Castillo del Buitron to Huelva, equipped with 18 locomotives. The company was said, 1908, to have projected an extension of the line to La Rábida.

Production from Spanish mines was 103,225 metric tons of cupriferous pyrite, 41,247 tons of pyrite and 1,258 tons of copper precipitate, 1908. The company formerly was a large purchaser of iron pyrites, but now supplies its own requirements, in the main. Production is estimated at 6,000,000 lbs. fine copper, 1913.

UNITED MINES OF UPPER KATANGA.

BELGIAN CONGO

Owned by Union Minière du Haut-Katanga, (which see).

UNITED PEAK DOWNS COPPER & COAL CO., LTD. QUEENSLAND

Office: Edwards St., Brisbane, Queensland, Aus. Mine office: Copperfield, Clermont Co., Queensland, Aus. John Currie, chairman; Currie, Buchanan & Co., secs.; J. T. Coates, mine mgr.; W. H. Rands, cons. engr. Organized 1908, under laws of Queensland, capitalization £75,000, shares 7s. 6d. par; issued, 130,000 shares, 4s. 6d. paid up. Company was a reconstruction of the Peak Downs Freehold Copper & Coal Co., Ltd., which was a reconstruction of the Peak Downs Copper Co.

Property is the old Peak Downs mine, 37 acres freehold, which, in early days, carted ore about 300 miles, securing profits therefrom of £278,250, in 15 years' operation. The mine, reopened 1906, by predecessors of the present company, has a vein of 2 to 3' average width carrying shoots of high-

grade ore, in 3 narrow parallel veins of 6 to 20" width, ore as a whole averaging about 4.5% copper. The mine, opened to depth of 270', has been thoroughly retimbered and when reopened old pumps and pipes were found converted into copper precipitate by the action of the acid mine waters.

The smelter, built some years ago, has reverberatory furnaces and a new 100-ton water-jacket blast furnace was blown in, July, 1907, working intermittently until Oct., 1907, when smelting was suspended. Mine considered promising, but will require extensive development, its high-grade ore having been picked out by the old management. Idle since Oct., 1907.

URETA é HIJOS; IGNACIO SILVA.

CHILE

Works office: La Ligua, Aconcagua, Chile. This firm owns the Ali-cahue smelter, 22 miles (37 km.) from La Ligua, with a carriage charge therefrom of 8 pesos per metric ton. The smelter has a Harnecker 36" circular water-jacket blast furnace, doing matting only, and smelting ore mainly from the Farellón mine. Slags average 0.5 to 0.75% copper. Operations are controlled by the high price of coke, which costs 100 pesos per metric ton, delivered, and boilers are stoked with wood.

VALDIVIA; FUNDICION DE.

CHILE

Owned by Compañía Minera de Combarbalá.

VALENCIANO-ANDALUZA DE ALTO HORNOS y MINAS DE PEÑAFLORES; SOCIEDAD.

SPAIN

Office: Glorieta, 1, Valencia, Spain. Mine office: Peñaflores, Sevilla, Spain. Don Baldomero Deu, president and agent. Capitalization, 150,000 pesetas, shares 250 pesetas par. Property is the Elvira mine and extensions, carrying copper and iron pyrites, at Peñaflores, and a group of claims, 144 hectares, at Pueblo de los Infantes, Sevilla. Idle.

VALIEVO (SERBIE); SOC. ANON. FRANÇAISE

DES MINES DE CUIVRE DE.

SERBIA

Office: 13 Rue Rougemont, Paris, France. Mine address: Rebelj, Valievo, Servia. M. Ducos, pres.; A. Bevelley, vice-pres. Organized Jan. 10, 1901, under laws of France, capitalization 2,000,000 francs, shares 100 francs par. Debentures, 50,000 francs, at 6%, in bonds of 100 francs par. Idle.

VALPELLINA; SOC. MINIERE ET FONDERIE DI.

ITALY

Office: Genes, France. Mine office: Ollomont, Torino, Italy. Owns the Preslohg mine.

VENTURE TRUST, LTD.

NORWAY

Secretary and office: E. Fairweather, 5 Moorgate St., London, E. C., Eng. Col. Sir. H. Melliss, chairman, E. L. Heinemann and H. E. Middleton, directors. Organized Jan. 1, 1913, as a reconstruction of the London Venture Corp., Ltd., capitalization £250,000, shares 4s. par; issued, 1,224,516 shares.

Property is the Birtavarre copper mine, in Norway, and sundry share holdings, the company being primarily an investment and securities holding corporation, with large interests in the Hay Gold Mining Co., Harmony Proprietary, Mexican Mining & Industrial Corporation, Jequie Rubber, West Jequie and Crude Rubber Washing companies.

VERCHOTURSKI WORKS.

RUSSIA

Owned by Pishminsko-Kluchevski Works, at Ekaterinburg, Perm, Russia.

VERCH-KYSHTIM WORKS.

RUSSIA

Owned by Kyshtim Corporation, Ltd., at Kyshtim, Perm, Russia.

VERCHOTURSKI WORKS.

RUSSIA

Owned by Nijni-Tagilsk Mines & Works at Nijni Tagilsk, Perm, Russia.

VICUÑA; FELIX.**CHILE**

Office and mine: Higuera, La Serena, Coquimbo, Chile. Property includes 5 mines and a smelter. La Champeta, the principal mine, is the deepest in the district, developing a number of parallel veins, the main vein of 5 to 7' width, dipping at 60 to 80°. An oxidized zone, of about 230' depth, is followed by rich secondary sulphides, succeeded by chalcopyrite ore averaging 10 to 15% copper, presumably after selection.

La Cortada and San Francisco mines, 3 hectares, are opened to a depth of 492' and of a horizontal length of 460', the working developing 2 main veins, of 3 to 5' average width, and a large number of secondary veins, walls being much broken, the mine being almost a stockwerk. The ores average about 5% in copper tenor only, rendering them unavailable for present use, though of future promise.

The San Ramon mine, opened 1851, is 885' deep, with a vein of about 4' average width, carrying low-grade ores. The Panchita mine, opened 1850, is 1,148' deep. La Solitaria mine, opened 1893, is slightly developed to 496' depth.

The smelter, at Higuera, 18 kilometers from Totoralillo, the nearest rail point, has 3 small reverberatory furnaces, producing matte of about 50% average copper tenor, sent to El Astillero works, at Huasco, for conversion.

Production has shown a considerable diminution in the past decade, having been 1,613,262 lbs. fine copper in 1903, 856,286 lbs. in 1906, 215,936 lbs. in 1908, and only 43,091 lbs. in 1909. No recent returns secured.

VICUÑA; SANTIAGO.**CHILE**

Office and works: Huasco, Freirina, Atacama, Chile. Property includes a mine, which is said to be nearly worked out, and 2 smelting plants. El Astillero works, at Huasco, include a mill having a crusher and stamps, and a smelter with 6 three-deck calcining furnaces and 3 reverberatory furnaces. El Ijirio smelter, at Morada, 27 kilometers from Sarco, the nearest rail station, has 2 reverberatory furnaces, producing matte of about 50% average copper tenor, shipped to El Astillero works for conversion. Carriage charges to the railway are 6 pesos per metric ton, and fuel is imported coke, costing 27 pesos per metric ton. Owners plan reconstructing and modernizing this plant in near future.

VIJSKI WORKS**RUSSIA**

Owned by Nijni-Tagilsk Mines & Works.

VIVIAN MINE.**QUEENSLAND**

Mine address: Cloncurry, Beaconsfield Co., Queensland, Aus. Messrs. Brady, Trainer & Sharpe, owners. Property, about 3 miles N. of the junction of Florence and Granite Creeks, is developed by 2 shafts of 50 to 22', showing highly silicious ores carrying about 8% copper, found in very narrow veins, with occasional gold values up to \$7 per ton.

VIVIAN & SONS.**WALES**

Office and works: Swansea, Glamorganshire, Wales. This firm, of which the late Lord Swansea was the head, is one of the oldest metallurgical enterprises in Wales. The Hafod works, at Swansea, dating from 1810, include smelters for the treatment of gold, silver, lead, copper, zinc and complex ores, and a small electrolytic refinery. There are a number of manufacturing plants, including rolling mills for copper plates and sheets; lead works for the manufacture of pig and bar lead, and lead pipes, rods and sheets; spelter works for making zinc plates; bluestone works for the manufacture of copper sulphate; sulphuric acid works, and fertilizer works utilizing the acid. The firm also owns the Margam works, at Port Talbot, near Swansea, with rolling mills making copper, brass and yellow metal sheets, tubes and other finished products, and owns collieries in Wales.

VLADIVOSTOCK DE COLLAHUASI; COMPAÑIA MINERA. CHILE

Office: Iquique, Chile. Mine office: Collahuasi, Tarapacá, Chile. Organized March 31, 1906, under laws of Chile, capitalization 640,000 pesos, shares 16 pesos par. No record of operations securable.

VOLCAN SMELTER.**CHILE**

Owned by Compañía Minera de Maipó, at El Volcan, Chile.

WALLAROO & MOONTA MG. & SM. CO., LTD. SOUTH AUSTRALIA

Office: Steamship Bldgs., Currie St., Adelaide, S. A. Mine offices: Wallaroo Mines, Kadina, S. A., and Moonta, S. A. Operating and works office: Port Wallaroo, S. A. Jas. Harvey, chairman; Sir Lancelot Stirling, Sir J. J. Duncan, J. R. Corpe and Simpson Newland, directors; David Davidson, sec.; H. Lipson Hancock, gen. mgr.; Jas. Pryor, asst. gen. mgr.; David H. Ladd, smelter supt. Union Bank of Australia, Ltd., Australia, bankers; Elder Smith & Co., Ltd., London agts.

Organized 1899, under laws of South Australia, as a merger of the Moonta and Wallaroo companies, capitalization £400,000, shares £2 par; issued, £320,000. To end of 1912 the company paid 44 dividends, aggregating £563,000 dividends having been £80,000 in 1906, £140,000 in 1907, £24,000 in 1909, £16,000 in 1910, £8,000 in 1911, and £60,000 in 1912. The Wallaroo Co., previous to the merger, produced copper to the value of £2,229,096, paying dividends of £430,254 therefrom, and the Moonta Co., preceding the merger, made copper to the value of £5,396,146, paying dividends of £1,168,000 therefrom, giving the property a total dividend record to Sept. 30, 1912, of £2,161,254, from about 50 years of operation. Net profits were £35,534 in 1909, £21,824 in 1910, £37,057 in 1911, £88,438 in 1912. Balance of assets Dec. 31, 1912, were £165,887.

Lands are extensive, including the Wallaroo and Moonta groups, about 10 miles apart, with various smaller properties, besides the site of the reduction plant at Port Wallaroo, all in Yorke's peninsula, on Spencer gulf. The Wallaroo mine was discovered 1860, and the Moonta 1861, and both mines have been operated, practically continuously, since 1863.

The Wallaroo group of mines, 6 miles E. of Port Wallaroo, includes the Kurilla, an adjoining property, about 1,500 acres in all. The property shows metamorphic mica-schist of Cambrian or pre-Cambrian age, carrying 6 nearly parallel N. W.-S. E. veins with varying dip. The veins are 6 to 33' thick, and connected by cross veins. These veins are traceable as lines of altered schist for nearly 2 miles, and are opened to about 2,500', but most of them pinching out with depth. On the 2,000' level, the payshoot is about 3,000' long with 600' further of mineralized vein matter that does not pay for extraction, but will be available for treatment later. Good values are maintained in the deepest workings. The gossan showed atacamite and copper carbonates, succeeded by a leached zone of 35 to 40' depth, followed by native copper, cuprite, melaconite, azurite and malachite, but these oxidized ores were worked out many years ago. At depth the ore carries chalcopyrite, associated with pyrite, hematite and occasional molybdenite in a quartz, calcspar, schist gangue. Copper occurs as chalcopyrite, the ore varying from 3 to 4% copper as mined, but concentrated about 4 into 1 for the smelter. Ore is mined by overhand stoping and wide workings are stilled and filled with waste, the drifts alone being kept open. The Wallaroo and Kurilla mines, jointly, have been opened by a number of shafts, mainly inclined on the veins, with 35 miles of workings, many of the shafts being old and abandoned. The principal shafts are Taylor's, Young's, Office, Boor's and Elder's, the first 3 used for hoisting, having 4-ton skips. New work for 1912 aggregated 2,847'.

Taylor's shaft, 2,472' deep, is the principal opening of the mine. The

old shaft was badly injured by fire 1904, and was replaced by a new vertical shaft from surface, connecting at depth of 840' with the old workings. Extensive storage bins have been installed between the various levels in this shaft. All mine water below the 750' level is handled by electric pumps.

Young's shaft, 2,145', Office shaft, 1,976', and the Boor's shaft, 1,595' deep, are the main openings. The Wallaroo mine, has an inflow of about 250,000 gals. of water daily, handled by a pumping installation with stations on the 750', 1,230', 1,830' and 2,430' levels, equipped with Worthington vertical 3-throw plunger pumps, driven by direct-connected constant speed 3-phase motors. An emergency pumping plant has stations on the 1,230' and 1,830' levels, with Worthington vertical 3-throw pumps, coupled to 60-h. p. 3-phase variable-speed motors by double spur gearing, these pumps starting and stopping automatically, under control of float attachments in the sumps that actuate a liquid starter.

The Kurilla mine, practically a part of the Wallaroo, is opened to a depth of 1,170', on a vein parallel to the main vein of the Wallaroo which has an orebody of 10 to 12' width that is lumpy, but has high-grade shoots averaging about 11% copper after sorting. Work was discontinued in the Kurilla mine, 1910.

The Moonta group includes the Moonta, Moonta Central and North Yelta mines, formerly 2,700 acres, held by leasehold from the Crown, but 950 acres, considered unprofitable, were surrendered in 1911. The country rock is an intensely hard, dense felsite porphyry, covered by silicious limestone holding 15% silica which weathers in rounded masses. The Moonta mine has 5 main and 22 lesser veins which vary from 6 to 30' wide. The main veins are fairly parallel, running N. E. but with numerous stringers and cross fissures. The orebodies are regular, and show quartz streaks on the footwall. Atacamite was found in the upper workings underlaid by a barren zone, 60 to 125' deep, below which small quantities of oxidized ores were found, lying on sulphide ores consisting of chalcopyrite, a little bornite and pyrite in a quartz gangue. The chalcopyrite also occurs in the country rock, particularly in cross fractures and cleavage planes. For many years, the Moonta ores averaged 20% copper after hand sorting, but the present output averages 3% copper for the crude ore.

The Moonta mine has been opened to a depth of 2,500' but shows very little ore below 2,000', most of the veins being worked out and ore reserves at the end of 1912 were only about 40,000 tons of 2 to 4% copper ore. The Moonta is an old mine and has many old shafts, mostly vertical for a short distance and then inclined following the dip of the vein. The main workings connect with Taylor's shaft, 2,570' deep, and development for the entire mine aggregates over 40 miles. New development for 1912 totalled 1,912', and 21,154 tons of granulated slag and about 10,000 of Parametta tailings were used for slope filling.

The Moonta Central mine was unwatered to the 180 fathom level in 1907 and a little fluxing ore mined until April, 1908. The North Yelta mine has been idle since 1907.

The central power plant at Wallaroo, enlarged 1907, effected a great saving in operating costs over the numerous small isolated installations of machinery. The poor quality of Beetaloo water has been overcome by the installation of condensers. Buildings include several shops and engine houses with large changing houses at the principal shafts.

The government railway line connects both the Wallaroo and Moonta mines with the reduction plant at Port Wallaroo. There are concentrators at both mines and the process followed at each is essentially the same. The ore is dumped from mine skips on grizzlies, passing to bins and carried

to the concentrators by railway cars. At the mills, the ore is crushed and goes to revolving trommels, from which oversize is sorted and selected by hand from traveling belts, with suitable bin arrangements. Concentrating ores, after passing half-inch mesh, are treated by Hancock jigs, the largest jigs at the Moonta mine, treating 25 to 30 tons of material hourly. The well-known Hancock jig, now in use throughout the world, was designed by the late H. R. Hancock, former general manager of this property, for the use of these mines. About 12 to 15% of the material is slimed, slimes going to spitzkasten for classification and distribution to vanners and round tables, which yield a product of 10% copper tenor.

At the Moonta mines coarse material and tailings from the wash are piled in heaps, weathered and leached. Heaps range 20 to 60' in height, the tops of the piles of coarser material being laid out in terraces. Ore heaps are systematically sprayed and the leach liquor, carrying 30 to 70 grains of copper per gallon, runs to vats. The leach heaps cover about 30 acres and contain about 1,250,000 tons of tailings, which require a considerable length of time for complete oxidation and thorough leaching. This company has purchased the tailings and slimes of the Paramatta Copper Mines, Ltd., for treatment.

Fine wastes and slimes are treated in a leaching plant where they pass through a series of vats containing leach liquor to which 12 to 20 lbs. of sulphuric acid are added for each ton of slimes treated. The slimes are agitated in the vat by revolving arms, the pulp, after agitation, passing to settling dams and clarifying reservoirs. The leach liquor is drawn off in earthen pipes to the main precipitating works, where it joins the liquor from the various tailings heaps, and copper is precipitated therefrom on scrap iron. The material from the settling dams is weathered and given a second and occasionally a third leaching. The average production of cement copper from these plants is 500 long tons yearly. Flotation plants, employing the patented process of the Minerals Separation Co., were installed 1912, with excellent results, the extraction of copper from crude ores running up to 95%.

The smelter, at Port Wallaroo, 7 and 10 miles distant from the Wallaroo and Moonta mines, respectively, does some custom work in addition to treating the company's ores.

In 1912, 65,920 tons of ore and precipitate were treated, and output of the smelter was 6,287 tons refined copper, 1,223 tons electrolytic copper, 102 tons bluestone, 1,757 oz. gold and 2,045 oz. silver.

The smelter has 2 blast furnaces, rebuilt 1907, and 4 refining furnaces. No. 2 furnace has been equipped with water jackets of mild steel plate, replacing cast-iron jackets. There are sintering pots for treating flue dust and fines. Slags are granulated and sent back to the mines for underground filling, this being the first property to make such use of slag.

The converter plant, installed 1910, is in a steel shed having a 50-ton Babcock & Wilcox electric crane, of 47' span. There are 2 Allis-Chalmers stands, operated electrically, with 5 shells, which are lined by an Ingersoll-Rand tamping machine, mounted on a jib crane. The company also has a small electrolytic refinery, and the final product is a copper of exceptional purity, sold through Aron Hirsch & Sohn.

The smelter power plant has steam and electric power, with a Belliss & Morcom engine, and there are 4 Samuelson blowers for furnace blast, the converters being supplied by a Fraser & Chalmers blowing engine and a Reavell air compressor. Coal is handled by a large electric gantry.

The company's private railway system connects the various mines with

the works, the line reaching all important shafts and shops, including many miles of railway, and there are 12 locomotives.

The acid works and bluestone plant, latter rebuilt 1907, are at the smelter, utilizing fumes from the burners, and considerable commercial acid is sold to a fertilizer company manufacturing superphosphate. Production of acid was 5,095 tons in 1912 and plant was idle 7 weeks. Bluestone, manufactured in connection with the acid plant, amounted to 102 tons in 1912.

Production, to Dec. 31, 1904, by this company, was copper valued at £4,281,342, and total value of production of the mines to that date was £12,245,554. Recent production has been as follows:

Year.	Lbs. copper.	Oz. silver.	Oz. gold.
1904	13,070,252	(not reported.)	
1905	14,563,097	(not reported.)	
1906	16,936,640	8,250	2,326
1907	19,314,480	5,845	2,009
1908	14,443,520	7,416	1,950
1909	11,860,800	4,995	1,819
1910	10,875,200	2,011	1,296
1911	13,616,960	1,400	1,222
1912	14,006,380	2,045	1,757
1913 (6 months)	7,023,520	(not reported.)	

The cost of finished copper was £72 11s. per long ton, equal to 15.7 cts. per lb., in 1906, and cost of copper f. o. b. ocean steamers, was £53 3s. 11d. per long ton, in 1909; £54 11s. 2d. per long ton in 1910; £51 5s. 5d. per ton, equal to 11.15 cts per lb. in 1911; £60 12s. per ton, or about 13 cts. per lb., in 1912. The mines are rapidly nearing exhaustion, but the management is thoroughly competent and progressive.

WALTER'S COPPER MINE.

SOUTH AUSTRALIA

Mine office: Beltana, So. Aus. Property, 5 miles S. of Beltana, is developed by a 20' shaft and opencuts, showing a wide vein of altered clay-slate impregnated with flakes and nodules of malachite and azurite and said to have given assays of 8.2% and 4.5% copper. Idle.

WARRA DIVIDEND CO., LTD.

SOUTH AUSTRALIA

Liquidated, 1912. Formerly at Hergott Springs, So. Aus. See Vol. X. **WARRA WARRA MINE.**

SOUTH AUSTRALIA

Mine address: Hergott Springs, So. Aus. Property comprises 160 acres showing alternating beds of kaolinized and indurated slates, sandstone and quartzite, carrying native copper in fine particles, cuprite, malachite, chalcocite and chalcopyrite. The main orebody is reported to average 50' in width, traceable 1 mile, carrying ore assaying 3 to 8% copper, hand-cobbed to an average tenor of 36% for shipment. Development is by vertical shafts of 60', 65', 80', 108' and 266', and by tunnels of 80', 110' and 160'.

The property was under development at various times by the Tasmanian Copper Co., Ltd., and Warra Dividend Co., Ltd., and in each instance abandoned for want of working capital.

WARROO GOLD & COPPER MINES, N. L.

QUEENSLAND

Office: Hoskin's Bldg., Spring St., Sydney, N. S. W., Aus. Mine office: Stanthorpe, Bentinck Co., Queensland, Aus. W. A. Benn, chairman; A. J. Dixon and E. M. Mitchell, directors; J. C. Benn, sec.; Selwyn R. Mort, mgr., at last accounts. Organized Aug. 18, 1909, under laws of New South Wales, as successor of Warroo Gold & Copper Co., N. L., capitalization £20,000, shares 10s. par. Has authorized a bond issue of £2,500.

Lands, 50 acres, held by mineral lease from the government, on tracts of 10 and 40 acres, latter having a 3' vein of pyritic quartz, carrying a little gold. Development includes a 200' main shaft, the upper levels showing

mainly gold values, and the 200', or bottom level, showing mainly copper values, with frequent assays of 10 to 12% copper. The mine was estimated to have 3,000 to 4,000 long tons of gold ore, developed 1911, averaging 55s. gold per ton, and 2,500 long tons of auriferous copper ore, estimated at 112s. value per ton. The 10-acre lease has a 110' shaft, showing a 3 to 4' vein, carrying ore assaying 8% copper and 1 oz. 6 dwts. gold per long ton.

Equipment includes a steam plant, with a double-cylinder hoist, and buildings include a smithy and changing house.

The smelter was blown in late Oct., 1910, but suspended shortly for repairs. The plant has a McMurtry sintering pot, replacing heap roasting.

The mine was being worked by tributors, for its gold ores alone, at last reports.

WEST AUSTRALIAN MINING CO., LTD.

VICTORIA

Was organized under laws of Great Britain Nov. 10, 1892, as the Victoria Copper Co., later changing name to present title, and after several more reorganizations is now known as the African & Australian Co., Ltd. (which see).

WEST BRITISH DEVELOPMENT SYNDICATE, LTD.

IRELAND

Office: 709 Tower Bldgs., Liverpool, Eng. Mine office: Crookhaven, County Cork, Ireland. Thos. L. Miller, liquidator; T. Holmes, mine mgr. Organized Aug. 16, 1905, under laws of Great Britain, capitalization £31,500, in £30,000 of 6% cumulative preference shares of £1 par, and 30,000 deferred shares of 1s. par. Property is the Browhead mine, at Crookhaven, carrying copper and lead ores, and leasehold lands at Berehaven, which are for sale.

WEST BURRA COPPER MINE.

SOUTH AUSTRALIA

Mine address: Burra Burra, So. Aus. The property, 3½ miles S. W. of the Burra Burra mine, shows a large deposit formation of ferruginous calcite carrying several narrow veins of copper carbonate ores. A 4" seam of malachite and small amounts of chalcocite are also noted at comparatively shallow depth. Development is by several pits, and shaft 30' deep, at last accounts.

WEST CARBERY COPPER ESTATES, LTD.

IRELAND

Office: 10 Bush Lane, London, E. C., Eng. Mine office: West Carbery, County Cork, Ireland. A. S. Caldwell and Dr. A. Drysdale, directors; A. Collins, sec. Organized 1908, under laws of Great Britain, capitalization £52,000, in £50,000 "A" shares of £1 par, and £40,000 "B" shares of 1s. par; issued, £2,402 "A" shares, fully paid. The mining properties, held by leasehold, are located at Ballycummisk, Foilnamuck, Rossbrin, Cappaghna-callee and Cappahglass, all in the Barony of West Carbery. No returns secured.

WEST MOUNT LYELL, LTD.

TASMANIA

Office: 20 Bucklersbury, London, E. C., Eng. Operating office: Hobart, Tasmania. Mine office: Gormanston, Montagu Co., Tasmania. R. E. Tyler, chairman; J. H. Wolf and J. E. Franck, directors; W. H. Bustard, sec., at last accounts. Organized Oct. 2, 1907, under laws of Great Britain, as a reconstruction of the Copper Mines of Mount Lyell West, Ltd., capitalization £100,000, shares £1 par.

Lands, 8 leases, 84 acres, formerly held by the West Mount Lyell Copper, Gold & Silver Mining Co. Tasmania Ltd., adjoin holdings of the Mount Lyell Mining & Railway Co., Ltd., showing several wide orebodies, giving assays of 3 to 7% copper, with small gold and silver values. Development is by 2 tunnels. The company has acquired gold mining claims in the Huaraki district of New Zealand. The copper properties are presumably idle.

WEST MUTOOROO MINE.**SOUTH AUSTRALIA**

Address: Mutooroo, via Cockburn, So. Aus. De Bavy Co., Broken Hill, N. S. W., owners. The mine was worked at different times by several companies, without success, and was idle for some time prior to May, 1912, when it was reopened by the present owners. Ores are low-grade sulphides, valuable chiefly for their sulphur content, and are said to carry about \$2 gold per ton.

WHIM WELL COPPER MINES, LTD.**WESTERN AUSTRALIA**

Secretary and office: Henry Bacon, 62 London Wall, London, E. C., Eng. Mine office: Whim Creek, West Pilbarra Goldfield, W. Aus.; Herbert R. Sleeman, gen. mgr.; Edgar Anderson, chairman and managing director; S. Caldwell, Sidney Fawns, J. Conchie, W. S. Wilson and H. J. Silverlock, directors. Organized July 4, 1906, under laws of Great Britain, as a reconstruction of an old company of the same name, capitalization £150,000, increased Jan. 7, 1910, to £200,000 shares, £1 par; fully paid and fully issued. Debentures, £50,000, at 7%; issued, £22,500. Net profits for fiscal year ended March 31, 1912, were £23,683, and dividends have been 10% in 1909, 5% in 1910, 7½% in 1911, and 5% in 1912. The shareholdings of the company include 29,300 shares in the Mous Cupri, Ltd., a subsidiary company, organized 1910, to acquire certain leases formerly held by the parent company.

Lands, 300 acres, 100 freehold and 200 acres leasehold, known as the Whim Creek Mine, 12 miles from Port Balla Balla, with water rights on Balla Balla creek, various town lots, a leased jetty at Balla Balla and a 30-acre smelter site at Corringinna pool, a fresh water lake near Balla Balla. The property includes leasehold lands carrying iron ore and limestone for fluxing.

The Whim Creek mine, opened 1886 and operated by a Melbourne company, until closed 1901, and reopened, 1906, by this company, shows interbedded flat lenses of copper ore in foliated shales and schists, latter partly chloritic, but mainly hornblendic. The orebody consists of an irregular tabular impregnation of chalcocite, in silicious kaolinized beds having an approximately E.-W. strike and dip of 20 to 25° N., conforming to bedding of the enclosing rocks, which are considerably crumpled. Ore minerals are mainly malachite and chalcocite, but also include cuprite, melaconite, azurite, bornite and chrysocolla in the upper levels, the orebodies ranging from a few inches to 50' in width, with average thickness of 7' as estimated by the management, and a lateral extent of 3,000'. The property has been tested, by diamond drilling, 10 holes aggregating 2,000' in depth having been drilled, 1907-09, disclosing an ore zone up to 100' in width, carrying sulphide ores of 1 to 10% copper tenor.

Development consists of 5 shafts, deepest 160', and 8 tunnels of 100 to 800' lengths, with about 6,000' of workings in ore, mainly above the water level. Ore reserves are estimated at over 1,000,000 tons, averaging 5% copper. Ore on the dumps is said to measure up considerably over 55,000 tons that will carry about 7% copper.

The power equipment includes 6 small steam units, and 3 small gasoline units. The water is either alkaline or sulphurous, each destructive to the boilers alone, but a judicious mixture gives feed water causing very little corrosion in the boilers. The concentrator, of 200 tons daily capacity, erected 1912, and originally designed for the wet treatment of ores, was changed to the dry crushing method. The plant employs the Murex magnetic process, and is obtaining excellent results.

The company's private railway, of 14 miles length, runs from the mine to Port Balla Balla, and has 3 locomotives and 50 cars. The company owns

a 100-ton barge, and a motor tug for lighterage, and ore is exported in sailing vessels. About 130 men are employed.

Production was about 22,000 tons of 8% ore in 1909 and 17,000 tons of 10% ore in 1912. The company is not a producer of refined copper. Property considered promising.

WIDIN COPPER SYNDICATE, LTD.

BULGARIA

In liquidation. Alfred Thorp, liquidator, 57 Bishopsgate St. Within, London, E. C., Eng. Fully described Vol. X.

WILD DOG COPPER MINE.

NORTHERN TERRITORY

Mine address: Leigh Creek, N. T., Australia. The property, 2 miles S. E. of Leigh Creek, shows ferruginous slates carrying malachite and tetrahedrite, in small veins, the ore as mined said to give assays of 17 to 31% copper. Development is by opencuts and shallow shafts.

WILHELM; KONSOLIDIRTES ERZBERGWERK.

GERMANY

Office: Altenberg bei Seitendorf, Silesia, Germany. R. Kessler, pres.; G. A. Jütke, Dr. Probst and Ernst Nath, directors; A. Habicht, gen. mgr., at last accounts. Organized 1909, under laws of Prussia., capitalization 3,000,000 marks, shares 1,000 marks par, fully paid.

Lands, about 2,000 acres, including the Bergmannstrost, Wilhelm, Frisch auf Glück and Gesegnete Bergmannshoffnung, near Oberkauffung, and the Altenberger mine near Seitendorf.

Property shows slate and porphyry, dipping steeply, the average being about 80°. There are 8 known ore deposits, ranging in width from 10" to 30', traceable 25,000'. Ores contain malachite and copper sulphides and are said to average about 4% copper, 7 oz. silver and \$1.50 to \$14 gold per ton.

Development is by 2 shafts of 262' and 460' depth, with about 19,024' of underground openings, said to show 100,000 tons of ore.

WILLCOCK'S COPPER MINES, LTD.

QUEENSLAND

Presumably dead. Lands were passed, 1912, to the Corella Copper Co. (which see). Old company fully described Vol. X.

WILLIAMS, FOSTER AND PASCOE GRENFELL & SONS, LTD.

WALES

Office: Leadenhall Bldgs., Whittington Ave., London, E. C., Eng. Works office: Swansea, Glamorganshire, Wales. The company is a merger, effected 1892, of the 2 old firms of Williams, Foster & Co., owning the Morfa copper works, and Pascoe Grenfell & Sons, Ltd., owning the Middle Bank and Upper Bank copper works, successful copper smelters, at Landore, near Swansea. The firm has zinc and copper smelters at Middle Bank and Upper Bank.

WITKOWITZ; BERGBAU UND EISENHÜTTEN GEWERKSCHAFT.

AUSTRIA

Office: Fichtegasse 10, Vienna I, Austria. Mine office: Witkowitz, Mähren, Austria. The mine has a very small production of pyritic copper ore, carrying values mainly in sulphur, but the principal output is iron ore. The company has a small reduction plant, with an electrolytic refinery, having 72 tanks with electrodes arranged on the multiple plan, daily capacity being about 600 lbs. of finished copper.

The mine output for 1912 was 113,011 tons pyritic ore which was burned into red iron ore, and 647 metric tons copper ore treated with 142 tons of ore purchased. The production of cement copper was 998.4 tons, from company's own ores, valued at \$334,675, and holding 7.6364 kg. gold and 3,481.56 kg. silver.

YALPOODNIE COPPER & LEAD MINE.

SOUTH AUSTRALIA

Mine address: Franklin Harbor, So. Aus. The property, 16 miles W. of Franklin Harbor, shows gneiss cut by well-defined vein of ferruginous

quartz, 4 to 6' wide, carrying azurite and malachite with patches of galena. Ore on the dumps gives assay values of about 1 oz. silver, 1% lead and 12% copper. Development is by shafts of 30' and 120', and numerous shallow pits and open cuts spread over a distance of about 600'. The mine was reopened 1913, after several years idleness.

YARRANGOBILLY COPPER MINING CO., N. L.

NEW SOUTH WALES

Mine office: Yarrangobilly, Buccleuch Co., N. S. W., Aus. Organized 1908, under laws of New South Wales, capitalization £2,000, shares £20 par, fully issued and fully paid.

Property, 7 miles from Yarrangobilly, has a 3' vein carrying carbonate ore at surface, with occasional sulphides at shallow depth, and is said to have shipped some good ore. No recent returns secured.

YELTA MINE.

SOUTH AUSTRALIA

At Wallaroo, So. Aus. See Parametta & Yelta. Is owned and operated by the State Government of South Australia as an experiment in socialism. The deficit on 1912 operations was £35,000.

YENISEI COPPER CO., LTD.

SIBERIA

Office: 34 Bishopsgate, London, E. C., Eng. Norman J. Wallworth, secretary. Organized 1902, under laws of Great Britain. capitalization £300,000, shares £1 par; issued, £224,907, fully paid. Property, at Abakansk, Siberia, was sold Sept., 1911, to the Siberian Copper Co. for 375,000 rubles cash and 500,000 shares in the purchasing company (which see).

YOUNG AUSTRALIA MINE.

QUEENSLAND

Mine address: Mulline, Cloncurry, Queensland, Aus. Hogan Bros., owners. Property, 11 miles W. of Friesland, is developed by several shallow shafts, deepest 35', showing a 4' lode of high-grade copper ore. The vein is traceable 2,500'. Ore minerals are principally malachite and chalcocite.

YTTERÖEN MINE.

NORWAY

Office: care H. & F. Bachke, owners, Trondhjem, Norway. Mine office: Ytterö, Trondhjem, Norway. This property, in the vicinity of the Meraker district, at one time supplied about one-fifth of the world's production of pyrites. Ores are clean, nonarsenical, cupriferous pyrites. Company has a concentrating plant running on old ore from the dumps.

YUSPENSSKI MINE.

SIBERIA

Owned by Spassky Copper Mine, Ltd.

ZALAMEA COPPER CO., LTD.

SPAIN

Secretary and office: W. E. Hopper, 151 Cannon St., London, E. C. Eng. Mine office: Zalamea la Real, Huelva, Spain. Arthur Lawrence, chairman; A. O. Evans and W. C. Puchard, directors. Organized June 6, 1906, under laws of Great Britain, with capitalization £25,000, shares £1 par; fully issued and fully paid.

Lands, 242 hectares, including the San Diego and San Eduardo mines, with their extensions, bought for £5,000 cash, the Mimbrera and San Diego groups, and the Esperanza group. The San Eduardo group includes 5 concessions, 54 hectares, near Aracena, showing an iron gossan, apparently but little developed.

The San Diego group, 95 hectares, 5 kilometers from Zalamea la Real, shows a strong gossan with approximately N.-E. strike and N. dip. Ore is said to occur as impregnations of malachite, chalcopyrite and cupriferous pyrite in a 6 to 40' vein, lying in a zone of decomposed feldspar rock. The ore carries 1 to 12% copper. The mine is developed by 2 tunnels and there is a 3-kilometer ground tram, using animal power for traction, connecting the mines with the nearest railway.

ZAMBESI CONSOLIDATED, LTD. PORTUGUESE EAST AFRICA

Secretary and office: Furness, Müller & Co., Ltd., 2 Finsbury Circus, London, E. C., Eng. Directors, Lord Louth, J. Brandon, C. C. Dillon and A. C. Hide. Organized May 25, 1911, capitalization £30,000, in 100,000 preferred shares, 5s. par, and 100,000 common shares, 1s. par; issued, 50,028 preferred shares and all of the common shares. The preferred stock is entitled to a fixed dividend of 7% and one-fifth of surplus profits, the common stock taking the remainder.

Lands, 960 acres, including the Cronlyhill and Robins claims, 14 miles from Tete, Zambezi, bought for £3,820 cash, and option on about 2,000 gold reef claims, aggregating 4,800 acres, in Portuguese Zambesi, calling for the payment of £8,680 cash, and £5,000 in deferred shares.

ZAMBESIA EXPLORING CO., LTD.**RHODESIA**

Secretary and office: L. Scotland, Friars House, New Broad St., London, E. C., Eng. Tyndale White, chairman; Robert Williams, managing director; other directors, S. Neave, J. W. Broomhead, C. F. Rowsell, Lord A. Butler and F. Honey; R. Williams & Co., mgrs. and engrs.; A. G. Keith, mgr., Bulawayo, Rhodesia. Organized March 26, 1891, capitalization £20,000, increased 1892, 1893, 1897, 1898, 1900, 1903, 1905, 1909 and 1911, to present figure of £870,000, shares £1 par; issued, 670,089, fully paid. Debentures, £250,000, at 5½%, callable at 105% on or before Feb. 28, 1916, at option of the company. A dividend of 100% was paid Feb. 7, 1896. Company floated the Tanganyika Concessions, Ltd.

Property consists of sundry lands and shareholdings, including about 38,348 acres farm lands; 19 town sites; a one-third interest in 30 mining claims; an 85% interest in 20 mining claims; a one-half interest in 10 mining claims; £172,359 shares in the Tanganyika Concessions, Ltd.; £731,260 Benguella Railway bonds; £10,000 Rhodesia Railways bonds; £11,272 Tanganyika Concessions, Ltd., bonds, and £1,425 shares in the Rhodesia Railways.

ZAMBEZIA; COMPANHIA DA.**PORTUGUESE EAST AFRICA**

Office: 53 Rua do Alecrim, 10, Lisbon, Portugal. French office: 7 Rue Lafayette, Paris, France. Mine office: Tete, Zambezia, Portuguese E. A. D. De Roma du Bocage, chairman. Organized 1892, under Portuguese royal decree, capitalization 2,700 contos de reis, shares 4,500 reis (£1) par; issued, 2,250 contos de reis. Property is a concession of 60,000 sq. miles, on either side of the Zambezi and Shire rivers, extending E. of the latter to the coast, and embracing the ports of Quelimane and Chinde, in Portuguese East Africa. The concession includes gold mines, large cupriferous fields of promise, at Macomba, Marabué, Boroma and elsewhere, a very large coal basin, lead mines, mines of graphite and other mineral properties. The territory controlled adjoins Rhodesia, and is accessible by stern wheelers, plying on the Zambezi river, and by many wagon roads. The whole concession has been opened for free prospecting and mining laws are liberal, an ordinance license entitling the holder to free prospecting for 1 year, with permission to protect, during the same time, an area of 700 meters radius, at a cost of £1, and a special license, protecting about 7,000 acres for 1 year is issued on approval, at £10. Mining companies pay 6% of their issued capital and private owners pay 2% of gross values of production to the company, and a small annual rent is paid for claims. The country lies 5,000' above sea level, having a healthy climate, and native labor is reported to be both plentiful and cheap.

ZANCUDO; COMPANIA MINERA DE.**COLOMBIA**

Office: Medellin, Antioquia, Colombia. Alejandro Lopez, managing director. Property includes the Zancudo, Chorros, Cateador and Muriel

gold and silver mines, and a small smelter at Sitio-Viejo. Ores are principally gold and silver, with a little copper as a by-product.

ZEEHAN-DUNDAS MINES, LTD.**TASMANIA**

Secretaries and offices: F. J. Warner, 126 Mansion House Chambers, London, E. C., Eng., and H. Simpson, 29 Murray St., Hobart, Tasmania. D. C. Griffith, chairman; L. Blacker and A. Mattei, directors; F. Vincent, mgr., North Dundas, Tasmania. Organized April 9, 1910, capitalization £20,000, shares £1 par; issued, 18,000 shares, 15s. paid in.

Lands, 120 acres, in the Zeehan district, including a silver-lead property, and a copper-nickel prospect, latter carrying a 14' vein of sulphide ore, traceable 1½ miles and said to have given assays of 11% nickel and 5% copper.

ZELAYA HERMANOS.**CHILE**

Office and works: Paipote, Atacama, Chile. Property is the Paipote smelter, treating custom ores from various mines, including La Pepa, Clodomira, Elvira and Los Ladrillos mines, ore coming mainly from the latter. The smelter has a cylindrical water-jacket blast furnace. No recent returns obtained.

Mine Information Bureau.

THE COPPER HANDBOOK OFFICE HAS COMPLETE INFORMATION CONCERNING ALL COPPER AND MOST GOLD AND SILVER MINES AND REPORTS WILL BE FURNISHED WITH DETAILED INFORMATION CONCERNING ANY COMPANY OR PROPERTY. THE AVERAGE COST OF SUCH REPORTS IS \$5 EACH, DEPENDING ON THE WORK REQUIRED.

APPLY TO

THE COPPER HANDBOOK

HOUGHTON, MICH.

PART IV.

COPPER STATISTICS.

In this section the statistics of the Copper Industry are grouped in tables and shown by graphic charts.

No discussion is given, since the compactness of the tables is a great advantage in using them for quick reference. The figures used are authoritative, being from official sources and in many cases reported especially for THE COPPER HANDBOOK. The grouping gives first the facts concerning the entire World, followed by European statistics, succeeded by American and this by Lake Superior figures.

The conversion table for ready comparison of English prices in pounds sterling per long ton, to cents per pound, will be useful to many readers.

WORLD'S COPPER SUPPLY.

The following table combines the statistics of the American Copper Producers' Association and the British visible supply. These figures cover commercial copper ready for consumption, but do not include the stocks in the hands of consumers, neither do they include sundry stocks in Holland and Germany, which probably fluctuate between a minimum of about 50,000,000 lbs., and a maximum of about 125,000,000 lbs., with a mean that probably approximates 60,000,000 lbs.:

(Pounds Avoirdupois.)

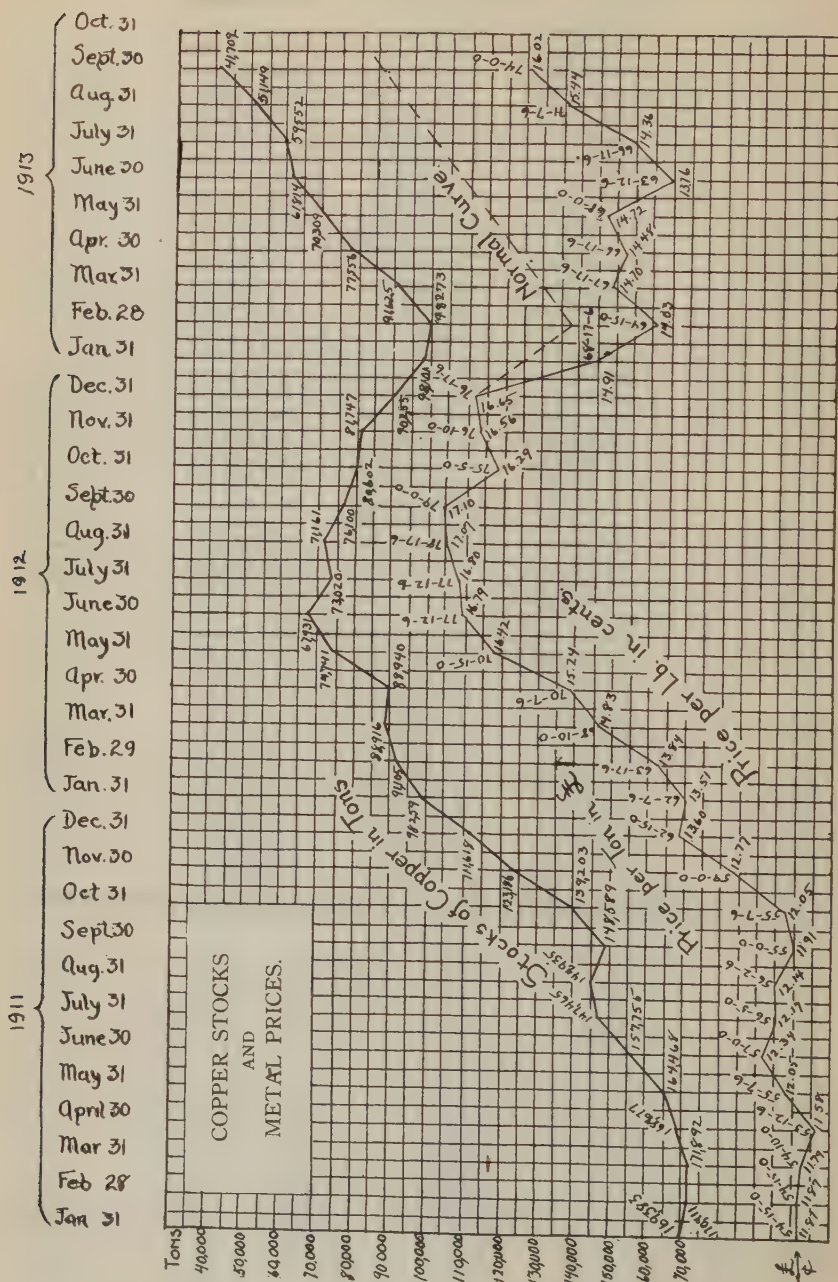
	American Stocks.	European Visible Supply.	Total Stocks.	Changes.
1909.				
January	122,357,266	124,716,480	247,073,746	.....
February	144,130,045	118,574,400	262,704,445	+ 15,630,699
March	173,284,248	117,140,800	290,425,048	+ 27,720,603
April	182,279,902	115,024,000	297,303,902	+ 6,878,854
May	183,198,073	114,050,320	297,248,393	— 55,509
June	169,848,141	127,352,960	297,201,101	— 47,292
July	154,858,061	150,928,960	305,787,021	+ 8,585,920
August	122,596,607	171,492,160	294,088,767	— 11,698,254
September	135,196,930	197,993,600	333,190,530	+ 39,101,763
October	151,472,772	210,224,000	361,696,772	+ 28,506,242
November	153,509,626	222,566,400	376,076,026	+ 14,379,254
December	153,003,527	236,587,600	389,861,127	+ 13,785,101
1910.				
January	141,766,111	244,204,800	385,970,911	— 3,890,216
February	98,463,339	248,236,800	346,700,139	— 39,270,772
March	107,187,992	254,150,400	361,338,392	+ 14,638,253
April	123,824,874	249,607,680	373,432,554	+ 12,094,162
May	141,874,159	246,863,680	388,737,839	+ 15,305,285
June	160,315,973	239,265,600	399,581,573	+ 10,843,734
July	168,276,017	232,863,680	401,139,697	+ 1,558,124
August	170,640,678	222,295,360	392,936,038	— 8,203,659
September	168,881,881	218,415,680	387,297,561	— 5,638,477
October	148,793,714	210,472,640	359,266,354	— 28,031,207
November	139,261,914	198,065,280	339,327,194	— 19,939,160
December	130,389,069	193,200,000	323,589,069	— 15,738,125

WORLD'S COPPER SUPPLY (Continued).

	American Stocks.	European Visible Supply.	Total Stocks.	Changes.
1911..				
January	122,030,195	187,705,280	309,735,475	- 13,853,594
February	142,439,490	186,359,040	328,798,530	+ 19,063,055
March	156,737,770	184,546,880	341,284,650	+ 12,486,120
April	162,007,934	184,278,080	346,286,014	+ 5,001,364
May	165,555,908	174,874,560	340,430,468	- 5,855,546
June	165,995,932	162,653,120	328,649,052	- 11,781,416
July	157,434,164	157,184,280	314,618,444	- 14,030,608
August	137,738,858	152,376,000	290,114,858	- 24,503,586
September	133,441,501	171,228,800	304,670,301	+ 14,555,443
October	140,894,856	171,945,600	312,840,456	+ 8,170,155
November	134,997,642	176,825,600	311,823,242	- 1,017,214
December	111,785,188	164,281,600	276,066,788	- 35,756,454
1912.				
January	89,454,695	218,313,920	307,768,615	+ 31,701,827
February	66,280,643	154,851,200	221,131,843	- 86,636,772
March	62,939,988	141,142,400	204,082,380	- 17,049,463
April	62,367,557	136,919,200	199,186,754	- 4,895,626
May	65,066,029	134,176,000	199,242,089	+ 55,335
June	49,615,643	117,801,600	167,417,232	- 31,824,857
July	44,335,004	93,255,520	137,590,524	- 29,826,708
August	50,280,421	100,858,240	151,138,661	+ 13,548,137
September	46,701,374	102,291,840	148,993,214	- 2,145,447
October	63,065,587	99,093,120	162,158,707	+ 13,165,693
November	76,744,964	97,059,200	173,804,164	+ 11,645,457
December	86,164,059	91,271,040	177,435,099	+ 3,630,935
1913.				
January	105,312,582	78,491,840	183,904,422	+ 6,469,323
February	123,198,332	77,504,000	200,702,332	+ 16,797,910
March	122,302,890	81,244,800	203,547,690	+ 2,845,358
April	104,269,270	87,180,800	191,450,070	- 12,097,620
May	75,549,108	85,948,800	161,497,908	- 29,952,162
June	67,474,225	77,235,200	144,709,425	- 16,788,483
July	52,814,606	71,904,000	124,808,606	- 19,900,819
August	53,594,945	66,420,480	120,015,385	- 4,793,221
September	38,314,037	63,716,800	102,030,837	- 17,984,548
October	29,793,094	53,625,600	83,418,694	- 18,612,143
November	32,556,352	48,787,200	81,353,582	- 2,065,112
December	47,992,429	46,592,000	94,521,429	+ 13,167,847

WORLD'S COPPER PRODUCTION FOR NINETEENTH CENTURY.

Decade.	(Long Tons.)				
	Average Price of Rough Copper.	World's Production of Each Decade.	Increase of Production Over Previous Decades.	Average Annual Production for Each Decade.	Increase of Average Annual Production.
1801 to 1810.....	£160	91,000	.....	9,100	.....
1811 to 1820.....	130	96,000	5,000	9,600	500
1821 to 1830.....	101	135,000	39,000	13,500	3,900
1831 to 1840.....	94	218,400	83,400	21,840	8,340
1841 to 1850.....	83	291,000	72,600	29,100	7,260
1851 to 1860.....	111	506,999	215,999	50,699	21,599
1861 to 1870.....	87	900,000	393,001	90,000	39,300
1871 to 1880.....	79	1,189,000	289,000	118,900	28,900
1881 to 1890.....	60	2,373,398	1,084,398	237,339	108,439
1891 to 1900.....	52	3,708,901	1,335,503	370,890	133,550
Totals and Averages....	£ 96	9,507,299	.....	95,073	351,796



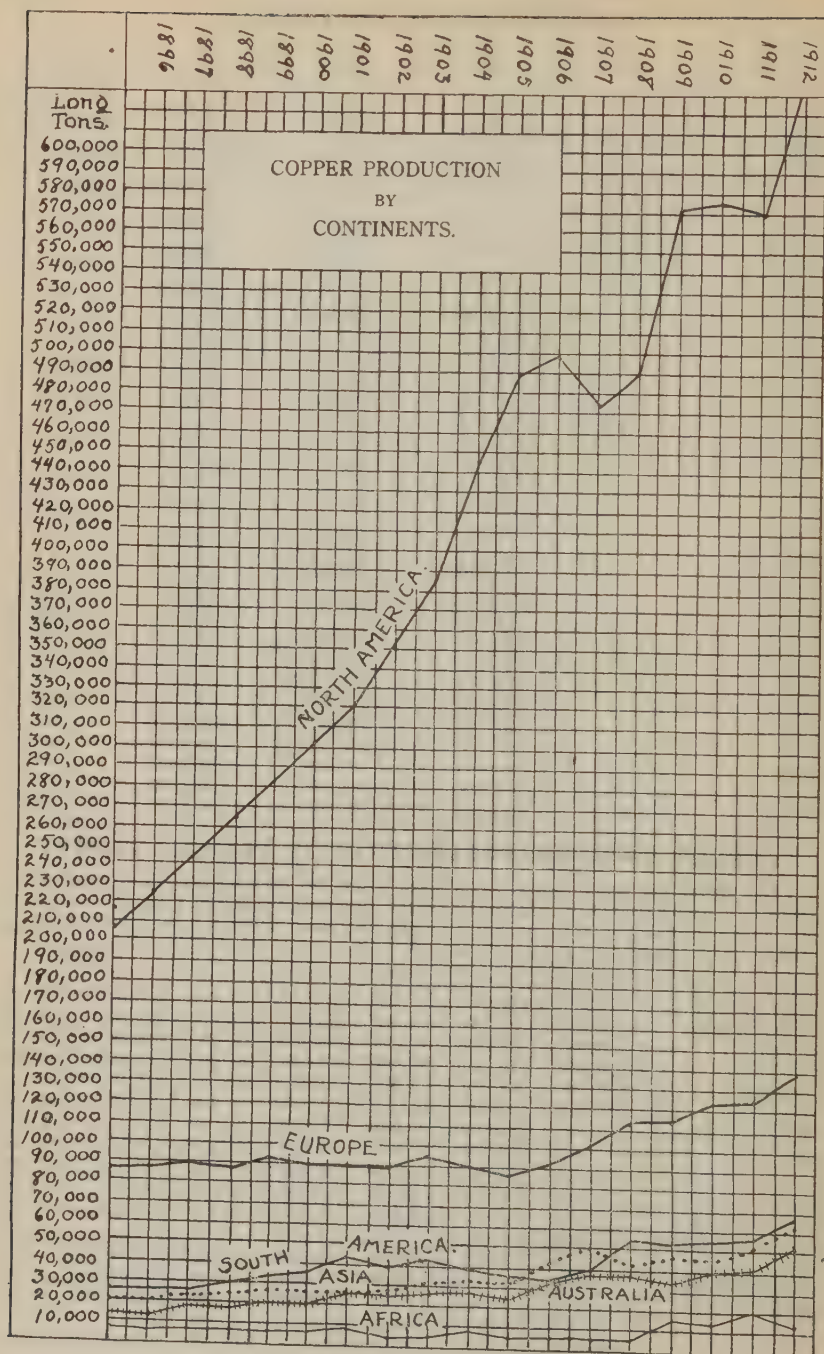
WORLD'S COPPER PRODUCTION.

Year.	United States.	Foreign.	Total	Percentage of U. S. Production.
1880.....	27,000	126,959	153,959	17
1881.....	32,000	131,000	163,000	19
1882.....	40,467	141,155	181,622	22
1883.....	51,574	147,832	199,406	24
1884.....	64,708	155,141	220,249	29
1885.....	74,052	151,540	225,592	32
1886.....	70,430	146,656	217,086	32
1887.....	81,017	142,781	223,798	36
1888.....	101,054	156,972	258,026	39
1889.....	101,239	159,966	261,205	38
1890.....	115,966	153,489	269,455	43
1891.....	126,839	152,552	279,391	45
1892.....	154,018	156,454	310,472	49
1893.....	147,033	156,497	303,530	48
1894.....	158,120	166,385	324,505	49
1895.....	169,917	164,648	334,565	50
1896.....	205,384	167,979	373,363	54
1897.....	220,571	178,384	398,955	54
1898.....	235,050	194,106	429,156	54
1899.....	253,870	215,140	469,310	54
1900.....	269,111	216,743	485,854	57
1901.....	268,522	242,497	511,019	53
1902.....	291,297	247,870	542,167	54
1903.....	311,582	273,499	585,081	54
1904.....	362,739	278,955	641,694	56
1905.....	402,704	293,005	695,709	57
1906.....	409,414	303,200	712,614	57
1907.....	386,655	326,500	713,155	54
1908.....	420,953	328,300	749,253	56
1909.....	485,473	355,000	840,473	57
1910.....	484,935	370,300	855,235	56
1911.....	483,865	390,000	873,865	55
1912.....	554,835	453,800	1,008,635	55

WORLD'S SMELTER PRODUCTION OF REFINED COPPER.

The following table, based upon figures of the Metallgesellschaft und Metallurgische Gesellschaft A.-G., gives estimated figures of production of raw copper of each country, whether from native or imported ores, matte or impure raw copper brought in for refining:

Country.	1900.	1905.	1908.	1909.	1910.	1911.	1912.
United States	286,900	412,600	447,700	528,600	527,700	518,700	592,400
Great Britain	80,000	67,900	71,400	66,400	71,000	67,700	63,200
Mexico	10,000	53,000	40,900	50,000	50,000	40,000	40,000
Japan	24,300	33,700	41,400	45,500	50,100	55,000	67,000
Germany	30,900	31,700	30,000	31,200	34,900	37,500	39,800
Australia	21,800	23,900	34,500	31,100	37,900	40,000	44,900
Chile	20,000	21,000	20,000	20,000	25,000	25,000	25,000
Canada	500	10,700	14,000	12,900	12,600	9,700	15,500
Russia	8,100	8,900	16,800	18,500	22,600	25,600	33,500
Europe, misc.	2,600	2,800	7,100	10,500	12,800	14,900	18,300
France	6,400	7,600	7,900	7,800	12,900	13,200	13,200
So. America, misc..	4,000	6,900	8,300	4,900	7,900	21,500	35,000
Italy	2,800	3,600	2,800	2,500	1,800	1,700	1,700
Austria-Hungary ..	1,200	1,400	1,300	1,800	2,300	2,600	4,000
Spain		8,200	14,600	17,500	17,400	18,300	23,300
Totals	499,500	693,900	757,800	849,200	886,900	891,400	1,016,800



WORLD'S COPPER PRODUCTION BY COUNTRIES.

(Based on the figures of Henry R. Merton & Co., Ltd.)

(Long Tons.)

Country.	1900.	1905.	1906.	1907.	1908.	1909.	1910.	1911.	1912.
Algeria		415	440	100					
Argentina	775	155	105	200	200	600	300	1,000	
Australasia	23,000	33,940	36,250	41,900	40,100	35,000	40,500	42,500	52,100
Austria	865	1,175	1,225	900	1,600	1,700	2,200	2,500	3,800
Bolivia	2,100	2,000	2,500	2,500	2,500	2,100	2,500	1,800	3,700
Canada	8,500	20,535	25,460	26,000	29,000	24,500	25,500	25,000	35,000
Chile	25,700	29,165	25,745	27,100	38,900	36,400	35,500	30,000	37,500
Cuba					3,000	2,700	3,500	4,500	4,000
Great Britain. .	650	715	500	700	700	700	500	500	
Germany	20,410	22,160	20,340	20,800	20,500	22,800	25,000	22,100	22,500
Hungary	490	150	210	100	100	4,600	100	100	100
Italy	2,955	2,950	2,865	3,400	3,000	2,800	3,200	2,600	2,200
Japan	27,840	35,910	42,740	49,700	43,700	47,800	46,300	55,400	65,000
Mexico	22,050	64,440	60,625	57,500	38,200	57,200	59,200	57,000	70,000
Newfoundland. .	1,900	2,280	2,295	1,800	1,500	1,400	1,100	1,200	500
Norway	3,935	6,305	6,120	7,100	9,300	9,400	10,500	9,400	9,500
Peru	8,220	8,625	8,505	10,800	15,200	16,300	18,400	25,700	27,300
Russia	8,000	8,700	10,490	15,200	20,400	18,000	22,500	25,800	33,200
Servia							4,900	8,700	7,500
South Africa. .	6,720	7,325	6,540	6,900	6,900	15,200	15,300	19,000	16,400
Spain & Port'g'l	52,872	44,810	49,320	50,500	53,400	53,000	50,700	52,500	59,000
Sweden		450	550	500	2,000	2,000	2,000	2,000	2,000
United States.	269,111	402,704	409,414	386,655	420,953	485,473	484,935	483,865	554,835
Turkey	520	700	425	1,300	1,100	800	600	700	500
Venezuela									
Miscellaneous. .									2,000
Totals	486,363	695,709	712,614	713,155	752,253	840,473	855,235	873,865	1,008,635

COPPER PRODUCTION BY CONTINENTS (in long tons).

Year.	No. America.	Europe.	So. America.	Asia.	Australasia.	Africa.	Totals.
1896.....	222,524	88,948	26,340	21,000	11,272	7,450	377,534
1897.....	242,679	90,829	25,300	23,000	16,583	7,440	405,831
1898.....	261,625	89,461	30,065	25,175	15,943	7,110	429,379
1899.....	282,636	93,383	32,730	27,560	20,894	6,490	465,693
1900.....	303,784	91,009	36,095	23,121	21,270	6,720	486,999
1901.....	320,044	91,161	43,080	27,475	28,633	7,472	517,865
1902.....	355,280	91,552	40,266	29,775	27,281	4,450	548,604
1903.....	384,138	94,056	42,561	31,360	28,116	5,230	585,461
1904.....	445,557	90,820	41,265	34,850	26,657	7,775	648,924
1905.....	489,959	88,215	39,945	35,910	33,940	7,740	695,709
1906.....	497,794	91,995	36,855	42,740	36,250	6,980	712,614
1907.....	471,955	102,000	40,600	49,700	41,900	7,000	713,155
1908.....	489,653	112,100	56,800	43,700	40,100	6,900	749,253
1909.....	571,273	115,800	55,400	47,800	35,000	15,200	840,473
1910.....	574,235	122,200	56,700	46,300	40,500	15,300	855,235
1911.....	571,565	126,900	58,500	55,400	42,500	19,000	873,865
1912.....	664,335	140,300	68,500	65,000	52,100	16,400	1,006,635

In 1912 North America produced approximately 66%, or about two-thirds of the entire copper output of the world; Europe second with 13%; South America with upwards of 6%; Asia fourth with upwards of 6%; Australasia followed with upwards of 5%, and Africa came last with slightly less than 2%.

PRODUCTION OF WORLD'S LARGEST MINES.

(Pounds Avoirdupois.)

Year.	Calumet & Hecla.	Anaconda.	Rio Tinto.	Boston & Montana.	Mansfeld.	Copper Queen.
1867.....	1,315,173		1,937,843		5,865,898	
1868.....	5,098,375		2,475,765		7,442,226	
1869.....	12,315,771		2,147,280		8,084,140	
1870.....	14,031,584		2,231,055		8,384,980	
1871.....	16,222,590		1,895,956		8,718,480	
1872.....	16,162,183		1,772,498		12,070,542	
1873.....	18,848,265				12,281,487	
1874.....	20,125,225				11,372,905	
1875.....	21,473,954				13,312,499	
1876.....	21,690,732		11,731,708		13,852,024	
1877.....	23,568,468		41,057,139		15,230,287	
1878.....	25,253,128		54,245,564		17,645,115	
1879.....	26,270,943		50,228,595		18,882,434	
1880.....	31,675,239		58,775,915		21,734,902	1,379,940
1881.....	31,360,781		61,171,913		24,377,210	3,866,581
1882.....	32,053,528		38,951,360		25,795,840	7,744,278
1883.....	33,125,045		45,857,280		28,310,320	7,523,981
1884.....	40,473,585		48,303,360		28,183,680	7,668,617
1885.....	47,247,990	36,000,000	52,604,160	7,500,000	27,888,000	6,663,782
1886.....	50,518,220	33,267,864	55,328,000	2,000,000	28,212,800	3,797,256
1887.....	46,016,123	57,000,000	63,840,000	1,500,000	29,176,000	5,707,728
1888.....	50,295,721	62,245,473	63,840,000	18,278,667	29,970,200	12,031,614
1889.....	48,668,296	61,647,000	66,080,000	25,425,228	34,733,440	12,152,910
1890.....	59,868,106	64,046,812	67,200,000	25,942,298	35,392,000	13,120,934
1891.....	63,586,620	46,500,000	71,680,000	25,000,000	30,920,000	13,022,957
1892.....	56,495,211	75,000,000	70,560,000	30,386,595	34,406,400	12,916,416
1893.....	60,427,913	75,256,657	69,664,000	31,800,000	31,696,000	13,795,618
1894.....	61,324,626	95,578,000	73,920,000	50,000,000	33,677,600	12,968,372
1895.....	79,137,399	99,775,294	75,040,000	55,000,000	33,286,400	16,235,723
1896.....	89,280,621	125,350,693	73,920,000	60,250,000	40,913,600	22,966,169
1897.....	83,248,054	131,471,127	75,936,000	60,000,000	40,230,400	23,999,873
1898.....	86,426,320	107,214,059	75,499,200	62,000,000	40,420,800	33,747,390
1899.....	89,610,963	107,914,357	76,988,800	65,000,000	46,558,400	36,901,684
1900.....	77,761,382	110,000,000	80,039,680	66,200,000	41,193,600	34,382,309
1901.....	82,519,676	101,850,224	79,179,520	70,000,000	41,067,200	39,781,333
1902.....	81,248,739	100,000,000	77,235,200	75,000,000	41,000,000	35,831,735
1903.....	76,490,869	93,500,000	80,214,400	90,750,000	42,500,278	36,385,000
1904.....	80,341,019	90,000,000	80,214,400	94,000,000	41,629,349	58,605,000
1905.....	95,100,610	95,000,000	72,307,200	89,000,000	43,824,141	64,570,847
1906.....	100,023,420	95,997,440	72,000,000	93,461,344	40,000,000	79,536,416
1907.....	83,863,116	63,055,661	72,390,080	Utah	38,822,000	66,916,972
1908.....	81,660,723	64,869,176	77,952,000	43,689,875	39,686,800	82,533,145
1909.....	78,652,618	75,860,194	80,640,000	51,749,233	41,891,400	84,802,147
1910.....	72,672,469	223,808,546	74,867,320	85,644,511	44,782,039	76,428,908
1911.....	74,130,977	259,407,093	74,782,400	92,514,419	45,968,114	74,489,728
1912.....	67,856,429	294,474,161	89,432,000	91,366,337	45,200,913	88,280,908

WORLD'S CONSUMPTION OF RAW COPPER.

From Metallgesellschaft und Metallurgische Gesellschaft A.-G. (in metric tons).								
	1905.	1906.	1907.	1908.	1909.	1910.	1911.	1912.
United States.....	276,300	300,000	232,600	210,600	318,900	339,900	321,900	371,800
Germany	128,000	151,100	149,800	180,700	179,100	209,400	222,100	232,700
Great Britain	103,300	107,600	108,200	128,900	109,100	146,000	159,100	144,700
France	56,400	65,500	65,000	73,900	73,100	85,700	95,700	99,800
Asia, Africa, Aust'lia	73,000	28,000	32,600	9,400	8,600	20,700	26,700	40,400
Russia	27,600	26,600	18,000	21,600	21,600	28,600	32,800	40,000
Austria-Hungary..	22,700	24,700	26,600	33,500	31,100	33,500	38,500	48,200
Italy	17,200	18,500	24,700	23,500	17,400	22,500	29,400	33,600
Belgium	8,600	9,000	9,500	11,000	13,000	13,000	13,500	15,000
Misc. Europe	4,000	4,000	4,500	5,200	6,400	10,400	10,000	10,000
Holland	2,400	2,400	2,500	1,000	1,000	1,000	1,000	1,000
Misc. America....	1,900	2,200	2,000	2,400	3,500	3,000	3,000	3,000
Totals	721,400	739,600	676,000	701,700	782,800	913,700	953,700	1,040,200

GERMAN COPPER TRADE.

From Metallgesellschaft und Metallurgische Gesellschaft A.-G. (in metric tons).							
Year.	Production.	Imports.	Gross Supply.	Exports.	Net Supply.	Con- sumption.	
1884.....	18,113	13,819	31,932	6,906	25,026	25,000	
1885.....	19,928	13,168	33,096	5,706	27,390	27,250	
1886.....	19,314	11,913	31,227	6,510	24,717	25,000	
1887.....	20,192	12,427	32,619	5,154	27,465	27,250	
1888.....	21,017	8,082	29,099	4,530	24,569	24,500	
1889.....	24,160	29,643	53,803	7,135	46,668	46,500	
1890.....	24,427	31,408	55,835	8,428	47,407	47,000	
1891.....	24,092	34,182	58,274	6,247	52,027	52,000	
1892.....	24,781	32,498	57,279	6,598	50,681	50,000	
1893.....	24,011	38,455	62,466	7,517	54,949	55,000	
1894.....	25,722	37,032	62,754	6,609	56,145	56,000	
1895.....	25,777	44,865	70,142	6,329	63,813	64,000	
1896.....	29,319	56,814	86,133	5,996	80,137	80,000	
1897.....	29,408	67,573	96,981	7,183	89,798	90,000	
1898.....	30,695	73,291	103,986	6,972	97,014	97,000	
1899.....	34,634	70,091	104,725	7,061	97,664	98,000	
1900.....	30,929	83,503	114,432	5,505	108,927	109,000	
1901.....	31,317	58,620	89,937	5,097	84,840	85,000	
1902.....	30,578	76,050	106,628	4,678	101,950	102,000	
1903.....	31,214	83,261	114,475	4,333	110,142	110,000	
1904.....	30,264	110,231	140,495	4,223	136,272	135,000	
1905.....	31,717	102,218	133,935	5,958	127,977	128,000	
1906.....	32,275	126,066	158,341	7,243	151,098	151,000	
1907.....	31,854	124,072	155,926	6,112	149,814	150,000	
1908.....	30,001	157,434	187,435	6,778	180,657	180,000	
1909.....	31,126	154,672	185,799	6,745	179,054	179,000	
1910.....	34,926	181,551	216,477	7,063	209,414	209,000	
1911.....	37,452	191,590	229,042	6,914	222,128	222,000	
1912.....	39,800	200,608	240,408	7,673	232,735	233,000	

ENGLISH COPPER TRADE (in long tons).

Year.	Production.	Imports.	Gross Supply.	Exports.	Net Supply.	Con- sumption.
1880.....	3,662	92,734	96,396	59,482	36,914	.....
1881.....	3,875	86,227	90,102	61,689	28,413	.....
1882.....	3,464	93,875	97,339	55,683	41,656	.....
1883.....	2,620	99,146	101,766	59,350	42,416	.....
1884.....	3,350	109,390	112,740	64,691	48,049	.....
1885.....	2,733	123,549	126,282	62,080	64,202	.....
1886.....	1,471	108,015	109,486	60,511	48,975	.....

ENGLISH COPPER TRADE (Continued).

Year.	Production.	Imports.	Gross Supply.	Exports.	Net Supply.	Consumption.
1887.....	389	103,089	103,478	69,453	34,025	.....
1888.....	1,456	135,470	136,926	72,066	64,860	3,667
1889.....	905	139,983	140,888	75,627	65,261	66,513
1890.....	935	141,249	142,184	89,747	52,437	84,930
1891.....	900	138,616	139,515	76,056	63,459	72,422
1892.....	495	134,371	134,866	82,542	52,324	54,254
1893.....	425	129,832	130,257	70,986	59,271	67,399
1894.....	445	125,008	125,453	54,689	70,764	62,617
1895.....	580	119,941	120,521	65,990	54,531	62,502
1896.....	580	135,856	136,436	59,334	57,102	61,370
1897.....	518	136,555	137,073	56,542	80,531	86,245
1898.....	640	139,704	140,344	63,256	77,088	81,312
1899.....	637	141,610	142,247	75,271	66,976	61,042
1900.....	765	154,941	155,706	56,997	98,709	105,586
1901.....	532	149,578	150,110	70,396	79,714	83,935
1902.....	482	160,201	160,683	69,156	91,527	97,639
1903.....	536	132,926	133,462	76,305	57,157	54,050
1904.....	493	157,897	158,390	73,447	84,943	88,039
1905.....	700	155,200	155,900	77,800	78,100	74,578
1906.....	700	145,400	146,100	66,300	79,800	76,159
1907.....	700	153,100	153,800	42,800	111,000	88,300
1908.....	700	193,000	193,700	34,400	159,300	128,900
1909.....	650	200,600	201,250	36,600	164,650	109,100
1910.....	460	159,800	160,260	43,000	117,260	146,000
1911.....	400	167,400	167,800	33,500	134,300	159,100
1912.....	400	157,500	157,900	27,400	130,500	144,700

BRITISH AND FRENCH STOCKS OF COPPER.

This table, based on the compilations of Messrs. Jas. Lewis & Sons, of London, gives estimates of the stocks of refined copper on hand in Great Britain and France on the first day of each year named. The "visible supply" given in the last column includes also shipments afloat from Chile and Australia to European ports.

(Long Tons.)

	Public Stocks.	Increase.	Decrease.	Visible Supply.
1888.....	35,001	.....	.....	.....
1889.....	96,198	61,197	.....	104,105
1890.....	94,942	.....	1,256	98,847
1891.....	62,449	.....	32,493	65,366
1892.....	53,486	.....	8,963	56,044
1893.....	51,556	.....	1,930	55,745
1894.....	43,428	.....	8,128	47,295
1895.....	51,575	8,147	.....	54,664
1896.....	43,604	.....	7,971	45,817
1897.....	31,776	.....	11,828	34,927
1898.....	27,895	.....	3,881	31,955
1899.....	22,346	.....	5,549	27,896
1900.....	17,517	.....	4,829	22,817
1901.....	24,435	6,918	.....	28,860
1902.....	15,701	.....	8,734	22,051
1903.....	11,215	.....	4,486	16,540
1904.....	5,601	.....	5,614	13,851
1905.....	10,009	4,408	.....	16,734
1906.....	5,683	.....	4,326	12,983
1907.....	9,324	3,641	.....	16,924
1908.....	13,060	3,736	.....	19,710
1909.....	46,227	33,167	.....	55,677
1910.....	101,972	55,745	.....	109,022
1911.....	72,997	.....	28,975	83,797
1912.....	47,353	.....	25,639	57,283

FRENCH COPPER TRADE.

The following table is based upon the compilations of the Metallgesellschaft und Metallurgische Gesellschaft A.-G.:

(Metric Tons.)

Year.	Pro- duction.	Imports.	Gross Supply.	Exports.	Net Supply.	Con- sumption.
1892.....	6,400	24,154	30,554	2,116	28,438	25,580
1893.....	6,600	26,060	32,660	2,204	30,456	28,596
1894.....	6,400	26,756	33,156	2,467	30,689	28,854
1895.....	8,245	32,656	40,901	3,163	37,738	32,388
1896.....	6,544	40,136	46,680	3,456	43,224	35,099
1897.....	7,400	48,028	55,428	3,559	51,868	43,100
1898.....	7,800	45,575	53,375	4,044	49,331	39,700
1899.....	6,600	49,515	56,115	6,882	49,233	42,600
1900.....	6,400	51,962	58,362	5,736	52,626	46,500
1901.....	7,000	41,196	48,196	5,122	43,074	34,300
1902.....	7,300	49,094	56,394	3,485	52,909	43,900
1903.....	6,900	46,834	53,734	4,658	49,076	42,700
1904.....	6,900	56,526	63,426	5,369	58,057	45,300
1905.....	6,200	56,500	62,700	6,600	56,100	50,200
1906.....	7,100	64,700	71,800	6,100	65,700	58,100
1907.....	7,500	62,800	70,300	4,900	65,400	65,000
1908.....	8,000	74,400	82,400	5,200	77,200	73,900
1909.....	7,500	71,300	78,800	4,600	74,200	73,100
1910.....	12,900	77,112	90,012	4,501	85,511	85,700
1911.....	13,200	84,541	97,741	2,835	94,906	95,700
1912.....	13,200	88,833	102,133	3,092	99,041	99,800

AUSTRO-HUNGARIAN COPPER TRADE.

The following table is based on the figures of the Metallgesellschaft und Metallurgische Gesellschaft A.-G.:

(Metric Tons.)

Year.	Pro- duction.	Imports.	Gross Supply.	Exports.	Net Supply.	Con- sumption.
1892.....	1,295	8,644	9,939	342	9,597	.....
1893.....	1,396	11,822	13,218	434	12,784	.....
1894.....	1,726	13,383	15,109	255	14,854	.....
1895.....	1,276	11,747	13,023	151	12,872	.....
1896.....	1,366	13,666	15,032	228	14,804	.....
1897.....	1,426	15,926	17,352	159	17,193	17,000
1898.....	1,343	17,442	18,785	173	18,612	18,300
1899.....	1,479	16,185	17,664	534	17,130	16,500
1900.....	1,200	18,970	20,170	471	19,699	18,700
1901.....	1,150	17,504	18,654	435	18,219	18,200
1902.....	1,350	18,256	19,606	436	19,170	19,200
1903.....	1,400	18,704	20,104	1,226	18,878	18,700
1904.....	1,463	22,532	23,995	747	23,248	23,100
1905.....	1,439	22,535	23,974	1,253	22,721	21,900
1906.....	1,457	24,488	25,945	1,271	24,674	24,200
1907.....	1,066	26,181	27,247	619	26,628	26,500
1908.....	1,338	33,259	34,597	1,125	33,472	33,000
1909.....	1,765	30,606	32,371	1,250	31,121	31,000
1910.....	2,279	32,217	34,496	977	33,519	33,500
1911.....	2,563	37,251	39,814	1,310	38,504	38,500
1912.....	4,026	45,460	49,486	1,332	48,154	48,200

RUSSIAN COPPER TRADE.

This table is based upon the compilations of the Metallgesellschaft und Metallurgische Gesellschaft A.-G.:

(Metric Tons.)

Year.	Pro- duction.	Imports.	Gross Supply.	Exports.	Net Supply.	Con- sumption.
1892.....	4,978	6,568	11,546	....	11,546	11,500
1893.....	5,100	8,756	13,856	....	13,856	13,750
1894.....	5,409	6,666	12,075	....	12,075	12,250
1895.....	5,854	8,100	13,954	....	13,954	14,000
1896.....	5,832	12,433	18,265	....	18,265	18,000
1897.....	6,941	12,507	19,448	....	19,448	19,500
1898.....	7,291	14,450	21,741	....	21,741	22,000
1899.....	7,533	11,100	18,633	....	18,633	18,500
1900.....	8,100	12,300	20,400	....	20,400	20,500
1901.....	8,100	10,900	19,000	....	19,000	19,000
1902.....	8,800	17,500	26,300	....	26,300	26,250
1903.....	10,500	14,450	24,950	....	24,950	25,000
1904.....	10,900	20,300	31,200	....	31,200	31,250
1905.....	8,900	18,700	27,600	....	27,600	27,500
1906.....	10,600	16,000	26,600	400	26,200	26,000
1907.....	15,000	4,500	19,500	1,500	18,000	18,000
1908.....	16,800	4,800	21,600	20	21,580	21,000
1909.....	18,500	3,500	22,000	400	21,600	22,000
1910.....	22,600	6,500	29,100	500	28,600	28,600
1911.....	25,600	7,800	33,400	600	32,800	32,800
1912.....	33,535	7,000	40,535	500	40,035	40,000
1913.....	35,295	.....	.....	.....	.....	.....

ITALIAN COPPER TRADE.

This table is based upon the compilations of the Metallgesellschaft und Metallurgische Gesellschaft A.-G.:

(Metric Tons.)

Year.	Pro- duction.	Imports.	Gross Supply.	Exports.	Net Supply.	Con- sumption.
1892.....	2,564	2,139	4,703	168	4,535	4,500
1893.....	2,371	3,043	5,414	157	5,257	5,250
1894.....	2,670	3,706	6,376	32	6,344	6,250
1895.....	2,375	4,350	6,725	84	6,641	6,750
1896.....	2,842	4,509	7,351	383	6,968	7,000
1897.....	2,930	5,032	8,012	222	7,790	7,750
1898.....	3,230	5,928	8,258	462	7,796	8,000
1899.....	3,032	5,006	8,038	1,355	6,683	6,500
1900.....	2,737	6,224	9,021	676	8,345	6,250
1901.....	3,483	5,982	9,465	100	9,365	9,500
1902.....	3,863	7,050	10,913	165	10,748	10,500
1903.....	3,620	6,096	9,716	162	9,554	9,750
1904.....	3,592	11,492	15,085	180	14,905	15,000
1905.....	3,578	13,795	17,373	170	17,203	17,250
1906.....	3,600	15,350	18,950	450	18,500	18,250
1907.....	4,000	21,000	25,000	300	24,700	25,000
1908.....	4,000	19,623	23,623	172	23,451	23,000
1909.....	3,000	14,729	17,729	302	17,427	17,500
1910.....	1,766	21,567	23,333	837	22,496	22,500
1911.....	1,663	28,510	30,176	743	29,433	29,400
1912.....	1,700	33,631	35,331	1,717	33,614	33,600

MISCELLANEOUS EUROPEAN COPPER TRADE.

This table is based upon the compilations of the Metallgesellschaft und Metallurgische Gesellschaft A.-G. It includes Sweden, Norway, Denmark, Holland, Belgium, the Balkan States and Spain and Portugal, but does not include copper production of the two latter named countries:

(Metric Tons.)

Year.	Pro- duction.	Imports.	Gross Supply.	Exports.	Net Supply.	Con- sumption.
1892.....	1,400	1,100	2,500	....	2,500	2,500
1893.....	1,600	1,400	3,000	....	3,000	3,000
1894.....	1,600	1,400	3,000	....	3,000	3,000
1895.....	1,500	1,400	2,900	....	2,900	2,900
1896.....	1,700	1,400	3,100	....	3,100	3,100
1897.....	1,700	2,500	4,200	....	4,200	4,200
1898.....	1,500	2,700	4,200	....	4,200	4,200
1899.....	2,300	2,800	5,100	....	5,100	5,000
1900.....	2,500	3,600	6,100	....	6,100	6,000
1901.....	3,100	5,200	8,300	....	8,300	8,500
1902.....	6,200	5,300	11,500	....	11,500	11,250
1903.....	8,000	4,500	12,500	....	11,900	12,000
1904.....	7,000	7,000	14,000	....	14,200	14,000
1905.....	7,700	8,000	15,700	....	15,000	15,000
1906.....	7,100	8,000	15,100	....	15,400	15,500
1907.....	7,500	7,500	15,000	....	15,000	15,000
1908.....	13,200	2,200	15,400	....	15,400	15,000
1909.....	28,000	....	28,000	7,000	21,000	21,800
1910.....	30,200	....	30,200	6,000	24,200	24,000
1911.....	32,200	....	32,200	8,000	24,200	24,500
1912.....	41,600	....	41,600	15,000	26,600	26,000

PRODUCTION OF LEADING MINES OF WORLD.

In this table are given annual products, for latest years available, of all the really important copper mines of the world, and also of a great majority of the smaller mines making as much as 100,000 lbs. avoirdupois of fine copper yearly. The products in round numbers are estimates, based upon the best information available, the other figures being exact returns.

(Pounds Avoirdupois.)

No.	Mine or Company.	Location.	Year.	Output.
1	Anaconda	Montana	1912	294,474,161
2	Phelps Dodge & Co.....	U. S. A. and Mexico.	1912	148,678,889
3	Utah Copper.....	Utah	1912	91,366,337
4	Rio Tinto.....	Spain	1912	89,432,000
5	Copper Queen.....	Arizona	1912	88,280,908
6	Calumet & Hecla.....	Michigan	1912	67,856,429
7	Nevada Cons.....	Nevada	1912	63,063,261
8	Cerro de Pasco.....	Peru	1911	48,600,926
9	Greene Cananea.....	Mexico	1912	48,157,847
10	Mansfeld	Germany	1911	45,200,913
11	Arizona	Arizona	1912	38,132,000
12	Copper Range.....	Michigan	1912	37,584,647
13	Superior & Pittsburg.....	Arizona	1912	36,618,399
14	Ray	Arizona	1912	34,674,275
15	Miami	Arizona	1912	32,832,609
16	Moctezuma.....	Mexico	1912	31,739,748
17	United Verde.....	Arizona	1912	31,565,539
18	Furukawa	Japan	1912	29,526,375
19	Boleo	Mexico	1912	28,336,000
20	Chino	New Mexico.....	1912	27,776,088
21	North Butte.....	Montana	1912	26,480,123

PRODUCTION OF LEADING MINES OF WORLD (Continued).

(Pounds Avoirdupois.)

No.	Mine or Company.	Location.	Year.	Output.
22	Detroit	Arizona	1912	24,802,789
23	Granby	British Columbia....	1912	22,641,758
24	United States Sm. & Ref....	Utah and California..	1912	21,152,620
25	Ashio	Japan	1912	20,921,987
26	Quincy	Michigan	1912	20,634,800
27	Mt. Morgan.....	Australia	1912	19,591,000
28	Osceola	Michigan	1912	18,413,387
29	Canadian	Ontario	1912	18,000,000
30	Mammoth	California	1912	18,000,000
31	Kosaka	Japan	1912	17,590,151
32	Hidachi	Japan	1912	17,301,184
33	Champion	Michigan	1912	17,225,508
34	Besshi	Japan	1912	16,968,866
35	Kyshtim	Russia	1912	16,812,000
36	Old Dominion.....	Arizona	1912	16,533,999
37	Bor	Servia	1912	16,500,000
38	Calumet & Arizona.....	Arizona	1912	16,490,229
39	Ahmeek	Michigan	1912	16,455,769
40	Mason Valley.....	Nevada	1912	16,058,493
41	Shannon	Arizona	1912	15,816,471
42	Great Cobar.....	Australia	1912	15,800,000
43	Mitsu-Bishi.....	Japan	1912	14,933,178
44	East Butte.....	Montana	1912	14,709,460
45	Lota i Coronel.....	Chile	1910	14,700,000
46	Britannia	British Columbia....	1912	14,300,000
47	Wallaroo & Moonta.....	Australia	1912	14,082,800
48	Chilena de Fundiciones....	Chile	1910	14,000,000
49	Mazapil	Mexico	1912	13,556,208
50	Shattuck-Arizona	Arizona	1913	13,500,000
51	Baltic	Michigan	1912	13,373,961
52	Tennessee	Tennessee	1912	13,252,634
53	Otavi	German S. W. Africa	1912	12,870,000
54	Mohawk	Michigan	1912	11,995,598
55	Mt. Elliott.....	Australia	1912	11,744,320
56	Cape Copper Co.....	Cape Province.....	1912	11,680,000
57	Backus & Johnston.....	Peru	1912	11,166,400
58	British Columbia.....	British Columbia....	1912	11,146,811
59	Sulitelma	Norway	1912	11,000,000
60	Mt. Lyell.....	Australia	1912	10,317,440
61	Bogoslovsk	Russia	1912	9,744,000
62	Braden	Chile	1912	9,500,000
63	Nevada Douglas.....	Nevada	1912	9,020,640
64	Spassky	Siberia	1912	8,955,520
65	Balaklala	California	1910	8,451,653
66	Wolverine	Michigan	1912	8,350,312
67	Isle Royale.....	Michigan	1912	8,186,957
68	Mason & Barry.....	Portugal	1912	7,925,120
69	Tamarack	Michigan	1912	7,908,745
70	Tharsis	Spain	1912	7,564,480
71	San Pedro.....	Mexico	1912	7,091,829
72	Nababoop	Cape Province.....	1912	7,042,600
73	Trimountain	Michigan	1912	6,980,713
74	Hampden-Cloncurry	Australia	1912	6,917,120
75	Caucase	Russia	1912	6,859,000
76	Caucasus C. Co.....	Russia	1912	6,787,200
77	Utah Cons.....	Utah	1912	6,506,814
78	Ohio	Utah	1912	6,554,015
79	Tintic	Utah	1911	6,157,175
80	Allouez	Michigan	1912	5,525,455

PRODUCTION OF LEADING MINES OF WORLD (Continued).

(Pounds Avoirdupois.)

No.	Mine or Company.	Location.	Year.	Output.
81	Namaqua	Cape Province.....	1912	5,463,400
82	Cordoba	Spain	1912	5,365,800
83	Mountain	California	1912	5,334,000
84	Ducktown	Tennessee	1912	5,213,000
85	Poderosa	Chile	1912	5,077,204
86	Cuba	Cuba	1912	5,000,000
87	Centennial-Eureka	Utah	1912	5,000,000
88	Catemou	Chile	1910	4,880,000
89	Osaruzawa	Japan	1912	4,829,656
90	Tuolumne	Montana	1912	4,716,017
91	O'okiep	Cape Province.....	....	4,637,600
92	Nijni-Tagilsk	Russia	1912	4,230,000
93	Chillagoe	Australia	1912	4,132,800
94	Corocoro	Bolivia	1912	4,116,200
95	Gatico	Chile	1910	4,020,000
96	Bully Hill.....	California	1910	4,000,000
97	Mond	Ontario	1912	4,000,000
98	Great Western.....	Arizona	1912	4,000,000
99	Esperanza	Spain	1912	4,000,000
100	Superior	Michigan	1912	3,921,974
101	Pishminsko-Kluchevski	Russia	1912	3,900,204
102	Giroux	Nevada	1912	3,817,083
103	Central Chili.....	Chile	1911	3,757,600
104	Snowstorm	Idaho	1912	3,685,336
105	Syssertsk	Russia	1912	3,646,100
106	Aljustrel	Portugal	1912	3,630,000
107	Ikuno	Japan	1912	3,622,353
108	Carrizal	Chile	1910	3,550,000
109	Furokura	Japan	1912	3,451,850
110	Whim Well.....	Australia	1912	3,400,000
111	Tyee	British Columbia....	1910	3,392,901
112	Chanaral	Chile	1910	3,370,000
113	Kedabeg	Russia	1909	3,324,079
114	Foldal	Norway	1912	3,310,000
115	Copiapó	Chile	1910	3,200,000
116	Calama	Chile	1909	3,170,000
117	Kafue	Rhodesia	1912	3,136,000
118	Seville	Spain	1912	3,113,600
119	Ogoya	Japan	1912	3,079,951
120	Great Fitzroy.....	Australia	1912	3,011,800
121	Cons. M. & S. Co. of Canada.	British Columbia....	1912	3,000,000
122	Many Peaks.....	Australia	1912	3,000,000
123	Empire	Idaho	1912	3,000,000
124	Arakawa	Japan	1912	2,809,459
125	Atacama	Chile	1910	2,735,000
126	Mina Montecatini.....	Italy	1905	2,638,906
127	Ani	Japan	1912	2,579,580
128	Davis Daly.....	Montana	1912	2,500,000
129	Natagua	Chile	1910	2,450,000
130	Butte-Ballaklava	Montana	1910	2,428,346
131	Penn-Wyoming	Wyoming	1908	2,384,356
132	Winona	Michigan	1912	2,307,237
133	National Metallurgical.....	Mexico	1906	2,295,270
134	Mina Guallatiri.....	Bolivia	1903	2,282,032
135	Pena	Spain	1911	2,248,960
136	La France.....	Montana	1907	2,168,975
137	"Lloyd"	Australia	1908	2,150,400
138	South Utah.....	Utah	1912	2,100,000
139	Paramatta	Australia	1905	2,069,760

PRODUCTION OF LEADING MINES OF WORLD (Continued).

(Pounds Avoirdupois.)

No.	Mine or Company.	Location.	Year.	Output.
140	Mass Cons.....	Michigan	1912	2,045,006
141	Rostvangen	Norway	1912	2,013,000
142	Famatina	Argentina	1911	2,000,320
143	Tilt Cove.....	Newfoundland	1912	2,000,000
144	Poderosa de Chuquicamata..	Chile	1912	2,000,000
145	Tacoma Steel.....	British Columbia....	1912	2,000,000
146	Kyloe	Australia	1912	2,000,000
147	Michigan	Michigan	1909	1,979,305
148	Hampden Cloncurry.....	Australia	1911	1,969,000
149	East Canada.....	Quebec	1912	1,957,241
150	Hibira	Japan	1912	1,932,368
151	Kunitomi	Japan	1912	1,927,688
152	Yusenji	Japan	1912	1,907,685
153	Hanaoka	Japan	1912	1,895,008
154	Mt. Lyell Blocks.....	Tasmania	1906	1,846,320
155	Grafton	Australia	1911	1,765,120
156	Saddle Mtn. (Gila).....	Arizona	1907	1,751,264
157	Superior & Boston.....	Arizona	1913	1,747,433
158	Centennial	Michigan	1912	1,742,338
159	Mitterberger	Austria	1910	1,730,611
160	Franklin	Michigan	1912	1,710,651
161	Stadtberger	Germany	1912	1,658,278
162	Yoshioka	Japan	1912	1,648,811
163	Hisanichi	Japan	1912	1,641,310
164	*New Dominion.....	British Columbia....	1911	1,611,880
165	Mt. Molloy.....	Australia	1907	1,519,603
166	Alaska Industrial.....	Alaska	1912	1,500,000
167	Eustis	Quebec	1912	1,500,000
168	Magma	Arizona	1913	1,500,000
169	Torreon	Mexico	1910	1,500,000
170	Huelva	Spain	1909	1,500,000
171	Makamine	Japan	1912	1,493,904
172	Nymagee	Australia	1906	1,491,840
173	Atlantic	Michigan	1906	1,439,082
174	Bingham	Utah	1912	1,427,780
175	San Miguel.....	Spain	1912	1,422,400
176	Messina (Transvaal).....	Transvaal	1912	1,400,000
177	Tomas Marambo	Chile	1910	1,390,000
178	Yoshitani	Japan	1908	1,355,258
179	Kamoishi	Japan	1912	1,341,403
180	Spruce Mountain.....	Nevada	1907	1,338,198
181	Roros	Norway	1912	1,300,000
182	Beatson	Alaska	1909	1,264,053
183	Capanne Vecchie.....	Italy	1905	1,261,031
184	Bede	Spain	1912	1,250,400
185	Adventure	Michigan	1907	1,244,874
186	Nagamatsu	Japan	1912	1,237,009
187	Victoria	Michigan	1912	1,224,911
188	Koundouroff	Russia	1912	1,224,000
189	Okura	Japan	1912	1,187,934
190	Transvaal	Mexico	1907	1,178,855
191	Kano	Japan	1912	1,173,600
192	Arizona Commercial.....	Arizona	1909	1,171,450
193	Edmundian	Port. E. Africa.....	1910	1,152,231
194	San Juan	Chile	1910	1,150,000
195	Mt. Cattlin.....	Australia	1907	1,147,020
196	Democrata	Mexico	1912	1,102,000
197	Ellamar	Alaska	1912	1,100,000
198	Hiragane	Japan	1912	1,083,180

*New Dominion produced 7,304,713 lbs. copper in 1913.

PRODUCTION OF LEADING MINES OF WORLD (Continued).

(Pounds Avoirdupois.)

No.	Mine or Company.	Location.	Year.	Output.
199	Keating Gold.....	Montana	1912	1,080,000
200	Yakuki	Japan	1912	1,051,415
201	Suc. C. J. Lambert.....	Chile	1910	1,050,000
202	Cadia	Australia	1906	1,043,840
203	Ota	Japan	1912	1,028,869
204	L. A. Proano.....	Peru	1912	1,000,000
205	Lake	Michigan	1912	1,000,000
206	Arghana Maaden.....	Turkey	1912	1,000,000
207	Mina El Monte.....	Chile	1909	985,125
208	New Queensland.....	Australia	1912	926,200
209	Suc. Cervero.....	Chile	1903	923,458
210	Avino	Mexico	1910	910,499
211	Blinman	Australia	1907	898,240
212	Abeshiro	Japan	1912	897,560
213	Kansanshi	Rhodesia	1912	888,800
214	Daly West.....	Utah	1911	877,414
215	Sukask	Russia	1912	864,000
216	Omori	Japan	1912	847,746
217	Helvetia	Arizona	1909	841,675
218	S. Vicuna.....	Chile	1910	840,000
219	Salt Lake.....	Utah	1912	833,920
220	Mina El Incienso.....	Chile	1910	830,000
221	Tacna	Chile	1903	806,839
222	Santa Fe.....	New Mexico.....	1912	801,895
223	Suc. Juan Munoz.....	Chile	1903	791,958
224	Maipo	Chile	1910	790,000
225	Homanzan	Japan	1912	778,306
226	Lost Packer.....	Idaho	1908	773,247
227	Mochikura	Japan	1912	764,475
228	Obie	Japan	1912	759,831
229	Mizusawa	Japan	1912	744,228
230	Sasagatini	Japan	1912	717,719
231	Rush & Brown.....	Alaska	1912	700,000
232	El Orito.....	Chile	1908	698,564
233	F. Bodelon i Ca.....	Chile	1907	696,650
234	Jimulco	Mexico	1912	684,420
235	Yenisei	Siberia	1912	649,800
236	Mt. Cannindah.....	Australia	1907	581,280
237	Salida	Colorado	1907	576,696
238	Kanglara	Australia	1912	560,000
239	Le Roi No. 2.....	British Columbia...	1912	550,000
240	Bogan River.....	Australia	1912	537,600
241	Omodani	Japan	1912	528,995
242	Galizurski	Russia	1908	528,044
243	Ferrocobrizas	Spain	1911	500,000
244	Tocopilla	Chile	1909	500,000
245	Mungana	Australia	1912	400,000
246	San Gerardo.....	Peru	1908	396,828
247	Tokito	Japan	1912	395,521
248	Utah & Eastern.....	Utah	1908	391,779
249	Ricardo Bentin.....	Peru	1908	391,140
250	Chihara	Japan	1912	390,130
251	Tsubaki	Japan	1912	364,624
252	United	Washington	1908	360,000
253	Tsuboi	Japan	1907	354,855
254	Grand Gulch.....	Nevada	1912	350,000
255	Carmen	Peru	1908	349,870
256	Kobyaku	Japan	1908	341,683
257	Innai	Japan	1908	338,830

PRODUCTION OF LEADING MINES OF WORLD (Continued).

(Pounds Avoirdupois.)

No.	Mine or Company.	Location.	Year.	Output
258	Ruddygore	Australia	1907	337,276
259	Itsuki	Japan	1907	330,262
260	Horopetsu	Japan	1912	322,063
261	Hall	British Columbia....	1904	318,124
262	Nanganobori	Japan	1912	313,390
263	Wolverine & Arizona.....	Arizona	1909	301,274
264	Tip Top.....	Arizona	1906	298,890
265	Girilambone	Australia	1906	293,440
266	Leonard	Arizona	1909	283,597
267	Tomioka	Japan	1912	283,049
268	Phoenix Cons.....	Michigan	1905	273,219
269	Mt. Hector.....	Australia	1907	261,968
270	American-Mexico	Mexico	1904	261,531
271	Yoshiwara	Japan	1912	260,488
272	Kidogasawa	Japan	1912	259,711
273	Twin Buttes.....	Arizona	1910	258,672
274	Kokusei	Japan	1908	258,432
275	Huanillos	Chile	1903	245,085
276	Takara	Japan	1903	243,408
277	Arizona United.....	Arizona	1909	237,600
278	Burnie	Tasmania	1906	236,880
279	Vidal i Videla.....	Chile	1903	233,044
280	Takane	Japan	1907	231,838
281	Queen Bee.....	Australia	1912	230,720
282	Sawatari	Japan	1903	227,684
283	Matsuoka	Japan	1912	226,266
283	Kamisci	Japan	1912	224,280
284	Yakuwoji	Japan	1912	224,029
286	Mendoza y Ca.....	Mexico	1903	218,874
287	Felix Vicuna.....	Chile	1908	215,936
288	New Keystone.....	Arizona	1907	208,801
289	Unekura	Japan	1912	208,712
290	Mt. Flora.....	Australia	1907	208,320
291	Natividad	Peru	1907	204,938
292	Cucharas	Mexico	1903	200,618
293	Budgery	Australia	1912	200,000
294	Grand Central.....	Utah	1912	200,000
295	Nishinokawa	Japan	1908	194,707
296	Tsunatori	Japan	1912	192,836
297	Ideal	Arizona	1909	189,107
298	Combarala	Chile	1907	184,291
299	Kusakura	Japan	1912	180,515
300	Coahuila	Mexico	1903	178,865
301	Northwest S. & R. Co.....	Oregon	1905	174,458
302	Cutter Cove.....	Chile	1907	172,055
303	Mineral Hill.....	Arizona	1907	169,538
304	Komaki	Japan	1903	167,833
305	J. R. Espinoza.....	Chile	1909	166,903
306	Daiji	Japan	1908	165,158
307	Oarasawa	Japan	1908	163,755
308	Kawadayama	Japan	1912	161,082
309	Matsukawa	Japan	1912	160,905
310	Oe	Japan	1903	160,696
311	Iawa	Japan	1908	158,584
312	Futayezaka	Japan	1912	158,424
313	Duquesne	Arizona	1912	157,707
314	Blue Wing.....	North Carolina.....	1909	157,057
315	Asahi	Japan	1912	154,830
316	Akagare	Japan	1912	152,874

PRODUCTION OF LEADING MINES OF WORLD (Continued).

(Pounds Avoirdupois.)

No.	Mine or Company.	Location.	Year.	Output.
317	Iimori	Japan	1912	149,049
318	Huachumachay	Peru	1906	149,030
319	Otto Harnecker	Chile	1910	148,750
320	Kanasaka	Japan	1907	143,346
321	Koro	Japan	1912	138,495
322	Hirofani	Japan	1908	137,053
323	Ate	Japan	1908	134,087
324	Okuzu	Japan	1907	132,412
325	Dogamaru	Japan	1908	125,695
326	Commercial	Arizona	1907	125,598
327	Jose Larraguibel	Chile	1903	123,457
328	Keweenaw	Michigan	1908	122,474
329	Mitsui	Japan	1906	119,044
329	*Mitsui	Peru	1904	115,609
331	Kitsunozuka	Japan	1907	111,129
332	Queen	Arizona	1907	108,027
333	Irigoyen Hnos.	Mexico	1902	107,804
334	I. Silva Ureta e Hijos.	Chile	1909	106,923
335	Tomobuchi	Japan	1907	101,191

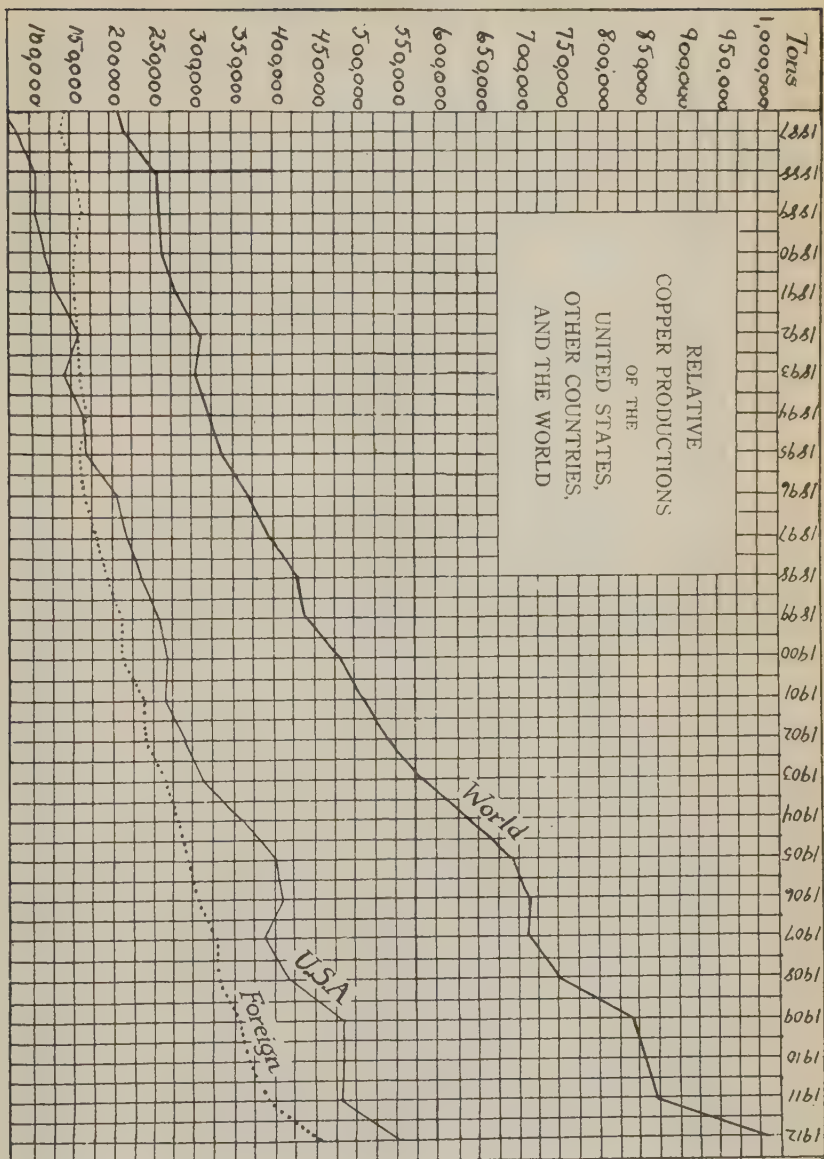
*Production 61,000 lbs. in 1912.

PROPORTION OF COPPER TO AMERICAN METAL PRODUCTION.

Year.	Total Value of Metallic Products.	Total Value of Copper Production.	Production of Copper in Pounds.	Percentage of Copper Values.
1888.....	\$253,731,822	\$ 33,833,954	231,270,622	13.3
1889.....	267,247,033	26,907,809	231,246,214	10.0
1890.....	305,735,670	30,848,797	265,115,133	10.1
1891.....	300,232,798	38,455,300	295,812,076	12.1
1892.....	307,936,189	37,977,142	352,971,744	12.3
1893.....	250,207,406	32,054,601	339,785,972	12.8
1894.....	218,332,494	33,141,142	364,866,808	15.2
1895.....	282,149,808	38,682,347	392,639,964	13.8
1896.....	287,860,155	49,456,603	460,061,430	17.2
1897.....	302,531,147	54,080,180	494,078,274	17.9
1898.....	343,748,268	61,865,276	526,375,591	18.0
1899.....	525,797,557	101,222,712	581,319,091	19.0
1900.....	550,425,286	98,494,039	602,808,839	17.9
1901.....	524,873,284	86,629,266	601,499,886	16.5
1902.....	642,258,584	76,568,954	659,508,644	11.9
1903.....	624,318,008	91,506,006	698,044,517	15.3
1904.....	542,081,983	105,629,845	812,537,267	19.5
1905.....	702,453,101	139,795,716	902,057,843	19.9
1906.....	886,110,856	177,595,888	918,635,216	20.0
1907.....	903,802,244	173,799,300	866,308,743	19.2
1908.....	549,923,116	124,419,335	942,936,449	22.6
1909.....	753,427,290	142,083,711	1,087,453,906	18.8
1910.....	749,285,310	137,180,257	1,080,159,509	18.3
1911.....	680,531,782	137,154,092	1,097,232,749	20.4
1912.....	867,103,085	205,139,338	1,243,268,720	23.6

AMERICAN COPPER PRODUCTION. (Long Tons.)

Year.	United States		Michigan		Montana		Arizona	
	Production.	Per cent.	Production.	Per cent.	Production.	Per cent.	Production.	Per cent.
1850...	650		572	88				
1852...	1,100		792	72				
1854...	2,250		1,819	81				
1855...	3,000		2,593	86				
1856...	4,000		3,666	91				
1857...	4,800		4,255	88				
1858...	5,500		4,088	74				
1859...	6,300		3,985	63				
1860...	7,200		5,388	74				
1861...	7,500		6,713	89				
1862...	9,000		6,065	67				
1863...	8,500		5,797	68				
1864...	8,000		5,576	69				
1865...	8,500		6,410	75				
1866...	8,900		6,138	69				
1867...	10,000		7,824	78				
1868...	11,600		9,346	80				
1869...	12,500		11,886	95				
1870...	12,600		10,992	87				
1871...	13,000		11,942	91				
1872...	12,500		10,961	87				
1873...	15,500		13,433	86				
1874...	17,500		15,327	87				
1875...	18,000		16,089	89				
1876...	19,000		17,085	89				
1877...	21,000		17,422	83				
1878...	21,500		17,719	82				
1879...	23,000		19,129	83				
1880...	27,000		22,204	82				
1881...	32,000		74,363	76				
1882...	40,467		25,439	62				
1883...	51,574		26,653	51	11,011	21	10,658	21
1884...	64,708		30,961	47	19,256	30	11,935	18
1885...	74,052		32,209	43	30,267	41	10,137	14
1886...	70,430		36,124	51	25,362	36	6,990	10
1887...	81,017		33,941	42	35,133	43	7,910	10
1888...	101,054		38,604	38	43,794	43	14,195	14
1889...	101,239		39,364	38	43,849	43	13,654	13
1890...	115,966		45,273	39	50,437	43	15,534	13
1891...	126,839		50,992	40	50,028	39	17,800	14
1892...	154,018		54,999	36	72,860	47	17,160	11
1893...	147,033		50,270	34	69,290	47	19,200	13
1894...	158,120		51,031	32	81,729	52	19,873	13
1895...	169,917		57,737	34	84,900	50	21,408	13
1896...	205,384		63,418	31	99,071	48	32,560	16
1897...	220,571		63,706	29	102,807	47	36,398	17
1898...	235,050		66,056	28	92,041	39	49,624	21
1899...	253,870		65,603	26	100,503	40	59,399	23
1900...	269,111		63,461	24	120,865	45	52,820	20
1901...	268,522		69,501	26	102,620	38	58,383	22
1902...	294,297		76,050	26	128,975	44	53,546	18
1903...	311,582		85,848	27	121,677	39	65,914	21
1904...	362,739		93,001	26	133,176	38	85,179	23
1905...	402,704		102,874	25	140,514	35	105,316	26
1906...	409,414		102,514	25	131,563	32	117,216	29
1907...	386,655		96,480	25	100,118	26	114,633	30
1908...	420,953		99,408	23	112,724	27	129,251	30
1909...	485,473		101,342	21	140,561	29	129,959	27
1910...	484,935		99,019	21	126,374	26	132,701	28
1911...	483,865		97,741	20	121,346	24	135,358	29
1912...	554,835		96,701	18	137,844	25	160,858	30



AMERICAN COPPER EXPORTS.

The United States government estimates of exports of copper, including ingot and various forms of refined copper, matte, blister copper and ores, and manufactured products, are as follows:

(Pounds Avoirdupois.)

Year Ending—	Ore and Matte.	Refined.	Value.
June 30, 1864.....	10,958,100	102,831	\$ 432,570
1865.....	22,519,706	1,572,382	1,544,870
1866.....	21,508,000	123,444	936,211
1867.....	8,773,100	4,637,867	791,901
1868.....	9,261,200	1,350,896	922,409
1869.....	12,141,800	1,134,360	592,698
1870.....	1,919,800	2,214,658	1,042,246
1871.....	5,444,500	581,650	915,431
1872.....	3,556,400	267,868	287,735
1873.....	4,525,200	38,958	259,076
1874.....	1,332,600	503,160	467,208
1875.....	5,130,500	5,123,470	1,815,266
1876.....	1,530,400	14,304,160	3,526,410
1877.....	2,143,200	13,461,553	3,023,394
1878.....	3,294,700	11,297,876	2,488,921
1879.....	2,307,000	17,207,739	2,933,205
1880.....	2,162,300	4,206,258	849,218
1881.....	995,800	4,865,407	876,395
1882.....	2,593,600	3,340,531	748,456
1883.....	11,292,300	8,221,363	2,348,004
1884.....	38,614,000	17,044,760	\$ 5,595,859
1885.....	43,230,000	44,731,858	10,187,024
Dec. 31, 1886.....	41,752,000	19,553,421	4,380,322
1887.....	50,128,000	12,471,393	4,114,456
1888.....	79,496,000	31,706,527	11,897,240
1889.....	81,850,000	16,813,410	10,209,722
1890.....	43,141,100	10,971,899	5,918,395
1891.....	67,212,000	69,279,024	15,703,543
1892.....	94,304,000	30,515,736	10,162,870
1893.....	83,504,000	138,984,128	18,935,497
1894.....	8,704,000	162,393,000	16,143,094
1895.....	27,648,000	121,328,390	14,938,309
1896.....	41,426,500	259,223,924	31,035,211
1897.....	18,128,000	277,255,742	32,755,053
1898.....	18,686,000	291,955,905	35,545,251
1899.....	7,454,000	246,826,331	43,485,654
1900.....	20,014,000	337,973,751	53,875,439
1901.....	24,602,592	194,249,828	36,071,448
1902.....	40,398,400	354,668,849	46,811,729
1903.....	27,531,840	310,729,524	44,365,155
1904.....	42,396,480	554,550,030	74,816,934
1905.....	84,421,320	534,907,619	86,408,731
1906.....	106,666,560	454,752,018	90,950,403
1907.....	222,075,840	508,929,401	106,875,174
1908.....	141,453,760	661,876,127	89,353,260
1909.....	134,131,200	682,846,726	88,770,074
1910.....	98,076,160	708,316,543	92,081,140
1911.....	129,729,600	786,553,208	98,319,125
1912.....	148,223,040	775,000,658	127,875,000

AMERICAN COPPER EXPORTS BY DESTINATIONS.

(Pounds Avoirdupois.)

Destination.	1900.	1905.	1909.	1910.	1911.	1912.
Holland	101,398,394	130,675,386	204,378,211	221,764,806	230,693,649	152,618,177
Germany	67,348,848	104,575,864	138,213,290	175,861,028	190,428,008	252,156,012
France	67,725,989	74,604,044	99,003,962	116,193,850	135,038,893	131,362,694
Great Britain	63,522,445	60,945,794	156,511,113	98,030,213	108,061,603	95,422,292
Italy	5,550,285	15,800,967	26,386,069	34,110,237	38,216,773	47,251,432
Austria-Hungary	.....	.....	.....	.....	44,200,202	38,558,151
British N. A.	1,616,778	3,019,450	6,790,410	5,628,487	8,931,582	30,302,856
Russia	5,650,423	18,418,982	3,519,216	6,848,311	15,601,688	4,961,473
Belgium	12,554,191	4,997,206	6,016,861	7,176,258	5,125,004	7,674,273
China .....	.....	79,940,250	.....	.....	.....	.....
Mexico	296,684	290,763	46,287	.....	.....	.....
Misc. Europe.	11,258,115	25,279,162	41,661,979	42,203,861	9,254,363	8,960,973
Miscellaneous	1,051,599	16,359,751	319,329	499,492	1,001,443	5,732,325
Totals.....	337,973,751	534,907,619	682,846,726	708,316,543	786,553,208	775,000,658

AMERICAN COPPER IMPORTS.

The following table, showing imports of copper, in various forms, into the United States, is summarized from the official figures of the United States government. The government statisticians have seen fit to vary the methods employed in presenting these figures, from time to time, but the present plan of giving contents in fine copper of imported ore and matte is preferable to the old plan of giving actual weight of imported ore and matte:

(Pounds Avoirdupois.)

Year.	Copper Contents. Ore and Matte.	Raw Copper.	Old Copper.	Total Fine Copper.
1890.....	3,448,237	5,189	284,789	3,960,053
1891.....	8,391,554	2,556	134,407	11,472,436
1892.....	7,669,978	22,097	71,485	8,066,647
1893.....	7,256,015	554,348	59,375	11,045,297
1894.....	4,804,614	606,415	160,592	11,445,441
1895.....	5,300,060	7,979,322	1,336,901	14,616,223
1896.....	5,900,000	9,074,379	2,422,554	17,396,933
1897.....	12,000,000	12,646,552	1,780,390	28,923,098
1898.....	19,750,000	5,892,944	1,986,133	73,916,467
1899.....	23,800,000	64,282,583	6,678,145	95,722,340
1900.....	36,380,000	62,404,489	3,354,756	105,176,808
1901.....	64,000,000	71,001,713	2,818,757	137,826,406
1902.....	40,000,000	112,420,253	2,119,031	194,501,757
1903.....	32,000,000	133,472,398	3,235,597	168,707,995
1904.....	38,947,772	142,344,433	4,000,000	181,292,205
1905.....	50,105,300	156,358,243	4,561,142	210,724,685
1906.....	49,034,891	176,558,390	6,487,226	225,843,281
1907.....	59,718,787	192,901,267	.....	252,620,054
1908.....	56,481,343	162,224,144	.....	218,705,487
1909.....	81,087,393	240,713,722	.....	321,801,115
1910.....	85,224,975	259,210,796	.....	344,435,771
1911.....	68,626,778	265,980,760	.....	334,607,538
1912.....	104,871,703	305,369,592	.....	410,240,295

AMERICAN COPPER TRADE.

This table, compiled from the figures of the Metallgesellschaft und Metallurgische Gesellschaft A.-G., of Frankfort-on-Main, gives all figures in round hundreds of tons:

(Metric Tons.)

Year.	Production.	Imports.	Total Supply.	Gross Exports.	Net Supply.	Consumption.
1897.....	224,100	12,200	236,300	130,900	105,400	117,400
1898.....	238,900	34,700	273,600	145,600	128,000	120,500
1899.....	258,000	46,500	304,500	114,600	189,900	169,000
1900.....	275,000	47,300	322,300	157,900	164,400	168,400
1901.....	273,000	80,100	353,100	100,800	252,300	189,800
1902.....	299,200	73,400	372,600	171,200	201,400	213,400
1903.....	316,600	75,900	392,500	145,400	247,100	236,100
1904.....	368,600	82,200	450,800	257,400	193,400	211,400
1905.....	395,300	95,700	491,000	250,300	240,700	276,300
1906.....	415,000	102,500	517,500	215,000	302,500	300,000
1907.....	405,900	115,000	520,900	243,300	276,700	232,600
1908.....	431,900	99,200	531,100	308,500	222,600	210,600
1909.....	498,100	146,000	644,100	316,200	327,900	318,900
1910.....	491,000	156,500	647,500	321,900	325,600	332,900
1911.....	498,700	152,100	650,800	359,800	291,000	309,800
1912.....	565,100	186,400	751,500	374,200	377,300	352,200

AMERICAN COPPER SUPPLY.

(Pounds Avoirdupois.)

Year.	Domestic Production.	Imports.	Total Supply.	Exports.	Net Supply.
1892.....	344,998,679	8,066,647	353,065,326	96,515,736	256,549,590
1893.....	329,354,398	11,045,297	340,399,695	188,984,128	151,415,567
1894.....	354,188,374	11,445,441	365,633,815	168,143,000	197,490,815
1895.....	380,613,404	14,616,223	395,229,627	136,528,390	258,701,237
1896.....	460,061,430	17,297,272	477,358,702	282,105,860	195,252,842
1897.....	494,078,274	28,578,420	522,656,694	288,662,340	233,994,354
1898.....	526,512,987	73,916,467	600,429,454	321,023,873	279,405,581
1899.....	568,666,921	95,722,340	664,389,261	252,876,480	411,512,781
1900.....	606,117,166	105,176,808	711,293,974	348,402,853	362,891,121
1901.....	602,072,519	137,826,406	739,898,925	222,137,911	517,761,014
1902.....	659,225,014	194,501,757	853,726,771	354,668,849	499,057,922
1903.....	729,943,131	168,707,995	898,651,126	310,729,524	587,921,602
1904.....	812,537,267	181,292,205	993,829,472	554,550,030	439,279,442
1905.....	902,057,842	210,724,685	1,112,782,528	534,907,619	577,874,909
1906.....	917,086,889	225,813,281	1,142,930,170	454,752,018	688,178,152
1907.....	865,818,368	238,031,320	1,103,849,688	508,924,401	594,925,287
1908.....	942,936,449	218,705,487	1,161,641,936	661,876,127	499,765,809
1909.....	1,087,453,906	325,456,533	1,412,910,437	682,846,726	730,063,711
1910.....	1,080,159,509	344,435,771	1,424,595,280	708,316,543	716,278,737
1911.....	1,097,232,749	334,607,538	1,431,840,287	786,553,208	645,287,079
1912.....	1,228,766,243	410,240,295	1,639,006,538	775,000,658	864,005,880

AMERICAN COPPER SUPPLY.

The following table gives the figures of American copper supply, deliveries and stocks, according to the statistics gathered by the American Copper Producers' Association:

(Pounds Avoirdupois.)

1909.	Stocks.	Production.	Deliveries.	Changes.
January.....	122,357,266	112,135,200	90,362,421	+ 21,772,779
February.....	144,130,045	103,700,817	74,546,614	+ 29,154,203
March.....	173,284,248	117,058,661	108,063,007	+ 8,995,654
April.....	182,279,502	113,574,292	112,656,121	+ 918,171

AMERICAN COPPER SUPPLY (Continued).

1909.	Stocks.	Production.	Deliveries.	Changes.
May	183,198,073	118,356,146	131,706,078	— 13,349,932
June	169,848,141	116,567,493	131,557,573	— 14,990,080
July	154,858,061	118,277,603	150,539,057	— 32,261,454
August	122,596,607	120,597,234	107,996,911	+ 12,600,323
September	135,196,930	118,023,139	102,182,932	+ 15,840,207
Adjustment		3,007,738	2,572,103	+ 435,635
October	151,472,772	124,657,709	122,620,855	+ 2,036,854
November	153,509,626	121,618,369	122,124,468	— 506,094
December	153,003,527	117,828,655	129,066,071	— 11,237,416
1910.				
January	141,766,111	116,547,287	159,850,059	— 43,302,772
February	98,463,339	112,712,492	103,987,840	+ 8,724,653
March	107,187,992	120,067,467	103,430,585	+ 16,636,882
April	123,824,874	117,477,639	99,318,354	+ 18,159,285
May	141,984,159	123,242,476	104,800,662	+ 18,441,814
June	160,425,973	127,219,188	119,259,144	+ 7,960,044
July	168,886,017	118,370,003	116,115,342	+ 2,254,661
August	170,640,678	127,803,618	129,563,051	— 1,759,433
September	168,881,245	119,519,983	139,607,514	— 20,087,531
October	148,793,714	126,469,284	136,001,084	— 9,531,800
November	139,261,914	119,353,463	128,226,308	— 8,872,845
December	130,389,069	123,339,219	131,698,093	— 8,358,874
1911.				
January	122,030,195	115,696,591	95,287,296	+ 20,409,295
February	142,439,490	109,828,297	95,630,017	+ 14,198,280
March	156,637,770	150,532,080	125,161,916	+ 5,370,164
April	162,007,931	118,085,223	114,537,249	+ 2,547,974
May	165,555,908	126,962,544	126,522,520	+ 440,024
June	165,995,932	124,554,312	133,616,080	— 8,561,768
July	157,434,169	112,167,934	131,863,240	— 19,695,306
August	137,738,858	125,493,667	129,791,024	— 4,297,357
September	133,441,501	115,588,950	108,135,595	+ 7,453,355
October	140,894,856	118,355,442	124,152,656	— 5,897,214
November	134,997,642	111,876,601	135,089,055	— 23,212,454
December	111,785,188	122,896,697	145,227,190	— 22,330,493
1912.				
January	89,454,695	119,337,753	142,511,805	— 23,174,052
February	66,280,643	116,035,809	119,376,464	— 3,340,655
March	62,939,988	125,694,601	126,267,032	— 572,431
April	62,367,557	125,464,644	122,766,172	+ 2,698,472
May	65,066,029	126,737,836	142,188,222	— 15,450,386
June	49,615,643	122,315,240	127,595,879	— 5,280,639
July	44,335,004	137,161,129	131,215,712	+ 5,945,417
August	50,280,421	145,628,521	149,207,568	— 3,579,047
September	46,701,374	140,089,819	123,725,606	+ 16,364,217
October	63,065,587	145,405,453	131,726,076	+ 13,679,377
November	76,744,964	134,695,400	125,276,345	+ 9,419,095
December	86,164,059	143,354,042	124,205,519	+ 19,148,523
1913.				
January	105,312,582	143,479,625	125,593,875	+ 17,885,750
February	123,198,332	130,948,881	131,845,015	— 896,134
March	122,302,198	136,251,849	154,284,777	— 18,032,928
April	104,269,270	135,333,402	164,053,564	— 28,720,162
May	75,549,108	141,319,416	149,394,299	— 8,074,883
June	67,474,225	121,860,853	136,520,470	— 14,569,619
July	52,901,606	138,074,602	137,384,263	+ 690,339
August	53,594,945	131,632,362	146,913,270	— 15,280,908
September	38,314,037	131,401,229	139,922,172	— 8,520,943
October	29,793,094	139,070,481	136,297,193	+ 3,773,288
November	32,556,382	134,087,708	118,724,661	+ 15,363,047
December	47,992,429	138,990,421	95,480,983	+ 43,509,438

UNITED STATES COPPER PRODUCTION BY STATES.

(Based on figures of United States Geological Survey.)

(Pounds Avoirdupois.)

State.	1908.	1909.	1910.	1911.	1912.
Alaska	4,438,836	4,057,142	4,311,026	22,314,889	31,926,209
Arizona	289,523,267	291,110,298	297,250,538	303,202,532	359,322,096
California	39,643,835	53,568,708	45,769,200	35,835,651	31,516,471
Colorado	13,943,878	11,485,631	9,307,497	9,791,861	7,963,520
Idaho	7,256,086	7,096,132	6,877,515	4,514,116	7,182,185
Michigan	222,647,918	227,005,923	221,462,984	218,185,236	216,609,751
Montana	252,503,651	314,858,291	283,078,473	271,814,491	308,770,826
Nevada	12,241,372	53,849,281	64,494,640	65,561,015	83,413,900
New Mexico.....	4,991,351	5,031,136	3,784,609	2,860,400	29,170,400
North Carolina..	29,391	120,451	.....	.....	.....
Oregon	271,191	245,403	22,022	125,943	311,860
South Dakota...	5,471	41,988	43	1,607	23,657
Tennessee	19,710,103	19,207,747	16,812,277	18,849,530	18,448,227
Utah	71,370,370	101,241,114	125,185,455	142,340,215	132,150,052
Vermont .....	.....	.....	.....	.....	.....
Washington	162,201	120,611	65,021	195,503	1,069,938
Wyoming	2,416,197	433,672	217,127	130,499	25,080
East and South..	173,490	1,318,460	.....	.....	.....
Miscellaneous ...	1,580,831	2,159,636	1,530,082	1,509,261	862,071
Totals	942,936,449	1,087,453,905	1,080,159,509	1,097,232,749	1,228,766,243
From imported ores and mattes...	218,705,487	325,456,533	344,435,771	334,607,538	410,240,295
Grand Totals..	1,161,641,936	1,412,910,439	1,424,595,280	1,431,840,287	1,639,006,538

LAKE SUPERIOR COPPER PRODUCTION BY MINES.

(Pounds Avoirdupois.)

	1906.	1909.	1910.	1911.	1912.
Adventure	1,552,628	.....	.....	.....	.....
Ahmeek	3,077,507	9,198,110	11,844,954	15,196,127	16,455,769
Allouez	3,486,900	4,031,532	4,655,702	4,780,494	5,525,455
Atlantic	1,439,082	.....	.....	.....	.....
Baltic	14,397,557	17,817,836	17,549,762	15,370,449	13,373,961
Calumet & Hecla...	100,023,420	78,652,618	72,672,469	74,130,977	67,856,429
Centennial	2,253,015	2,583,793	1,572,566	1,493,834	1,742,338
Champion	16,954,986	18,005,071	19,224,174	15,639,426	17,225,508
Franklin	4,571,570	1,615,556	966,353	820,203	1,710,651
Hancock .....	.....	.....	.....	754,749	.....
Isle Royale	2,937,098	5,719,056	7,567,399	7,490,120	8,186,957
Keweenaw .....	.....	57,091	.....	.....	.....
Lake .....	.....	.....	318,050	.....	* 700,000
La Salle .....	.....	.....	.....	280,598	.....
Mass	2,106,739	1,723,436	1,321,885	1,326,898	2,045,006
Michigan	2,375,341	1,979,305	36,682	.....	.....
Mohawk	9,352,252	11,248,474	11,412,066	12,091,056	11,995,598
Osceola	18,588,461	25,296,657	19,346,566	18,388,193	18,413,387
Quincy	16,194,838	22,511,984	22,517,014	22,252,943	26,634,800
Superior .....	.....	1,485,646	3,181,041	3,236,233	3,921,974
Tamarack	9,832,644	13,533,207	11,063,606	7,494,077	7,908,745
Tecumseh	58,088	.....	.....	.....	.....
Trimountain	9,507,933	5,282,404	5,694,868	6,120,417	6,980,713
Victoria	546,334	1,062,218	1,164,564	1,303,331	1,224,911
Winona	278,182	.....	.....	1,275,675	2,307,237
Wolverine	9,548,123	9,971,482	9,666,534	9,419,185	8,350,312
Miscellaneous	* 50,000	* 75,000	* 50,000	* 75,000	* 50,000
Totals	229,632,608	231,870,496	221,826,255	218,939,985	216,609,751

*Estimated.

PRODUCTION, VALUE AND DIVIDENDS OF LAKE COPPER.

Year.	Gross product fine copper (Pounds).	Gross value of production (Dollars).	Total dividends paid (Dollars).	Percentage of dividends to gross value.	Dividends per pound of copper (Cents).
1845.....	24,880	5,000	.....	.....	.....
1846.....	58,240	10,000	.....	.....	.....
1847.....	297,120	55,900	.....	.....	.....
1848.....	1,022,640	200,906	.....	.....	.....
1849.....	1,505,280	336,000	60,000	17.0	3.98
1850.....	1,281,280	286,000	84,000	29.0	6.55
1851.....	1,744,960	289,500	60,000	12.0	3.43
1852.....	1,774,080	396,000	60,000	15.0	3.38
1853.....	2,905,280	648,500	90,000	14.0	3.09
1854.....	4,074,560	909,500	198,000	21.0	4.85
1855.....	5,809,334	1,586,160	168,000	10.0	2.89
1856.....	8,217,392	2,218,320	380,000	17.0	4.62
1857.....	9,530,830	2,382,500	480,000	20.0	5.03
1858.....	9,159,916	2,129,235	460,000	21.0	5.00
1859.....	8,937,995	1,950,355	360,000	18.0	4.02
1860.....	12,068,375	2,654,960	120,000	5.0	0.99
1861.....	15,182,837	3,487,995	260,000	7.0	1.70
1862.....	13,586,318	3,634,255	440,000	12.0	3.23
1863.....	12,985,444	4,415,600	720,000	16.0	5.54
1864.....	12,491,965	5,870,300	1,150,000	19.0	9.20
1865.....	14,358,592	5,635,515	510,000	9.0	3.55
1866.....	13,750,063	4,629,375	170,000	3.7	1.23
1867.....	17,515,607	4,442,841	110,000	2.4	0.63
1868.....	20,934,124	4,940,424	100,000	2.0	0.47
1869.....	26,625,301	6,230,016	210,000	3.4	0.78
1870.....	24,622,759	5,096,752	700,000	13.0	2.86
1871.....	25,746,448	5,728,485	1,640,000	29.0	6.34
1872.....	24,553,523	7,979,400	3,080,000	38.0	11.54
1873.....	30,291,505	8,726,100	2,330,000	27.0	7.69
1874.....	34,334,389	8,009,356	1,940,000	24.0	5.06
1875.....	36,039,497	8,180,625	1,920,000	23.0	5.32
1876.....	38,270,997	7,998,430	1,870,000	23.0	4.88
1877.....	39,026,671	7,327,880	1,840,000	25.0	4.71
1878.....	41,687,266	6,920,540	1,860,000	27.0	4.46
1879.....	42,671,529	7,327,350	1,818,620	25.0	4.26
1880.....	49,718,337	9,947,673	3,080,000	30.9	6.19
1881.....	54,548,909	9,971,702	2,665,000	26.7	4.88
1882.....	57,155,980	10,522,416	2,850,000	27.1	4.99
1883.....	59,702,404	9,457,853	2,670,000	28.1	4.47
1884.....	69,353,202	9,494,306	1,327,500	12.9	1.91
1885.....	72,147,889	7,942,597	1,970,000	24.8	2.73
1886.....	80,918,460	8,788,476	1,900,000	21.5	2.34
1887.....	76,028,697	8,530,342	1,370,000	16.1	1.80
1888.....	86,472,034	14,510,001	3,260,000	22.4	3.77
1889.....	88,175,675	11,894,942	2,670,000	22.4	3.03
1890.....	101,410,277	15,819,960	3,415,000	21.6	3.36
1891.....	114,222,709	14,574,727	3,540,000	24.3	3.10
1892.....	123,198,460	12,431,624	3,260,000	26.2	2.64
1893.....	112,605,078	12,105,145	3,520,000	29.1	3.12
1894.....	114,308,870	10,852,122	2,380,000	21.9	2.08
1895.....	129,330,749	13,877,109	3,280,000	23.6	2.54
1896.....	142,057,500	15,758,935	3,985,000	25.3	2.80
1897.....	142,702,586	16,530,843	5,431,000	32.8	3.80
1898.....	147,965,738	17,829,871	6,857,250	38.4	4.63
1899.....	146,950,338	26,098,382	12,318,450	47.2	8.39
1900.....	142,151,571	23,691,928	9,811,200	41.3	6.90
1901.....	155,716,848	26,038,857	7,496,900	28.8	4.81

PRODUCTION, VALUE AND DIVIDENDS OF LAKE COPPER.

(Continued.)

Year.	Gross product fine copper (Pounds).	Gross value of production (Dollars).	Total dividends paid (Dollars).	Percentage of dividends to gross value.	Dividends per pound of copper (Cents).
1902.....	170,325,598	20,711,592	3,440,000	16.6	2.02
1903.....	192,299,191	26,383,449	4,980,000	18.8	2.59
1904.....	208,355,935	27,107,107	5,432,300	20.0	2.64
1905.....	230,437,992	36,616,586	9,224,600	25.2	4.02
1906.....	229,632,608	43,044,732	13,911,560	30.9	6.07
1907.....	216,116,747	43,319,940	13,469,950	31.1	6.23
1908.....	222,674,918	30,239,253	4,837,300	16.0	2.17
1909.....	231,870,496	31,256,141	6,309,200	20.2	2.72
1910.....	221,508,205	29,072,951	6,374,000	23.9	3.14
1911.....	218,939,985	27,965,206	5,376,125	19.2	2.45
1912.....	216,609,751	35,617,182	9,601,875	26.9	4.43
Totals	5,558,028,138	\$790,432,228	\$197,802,770	25.0	3.56

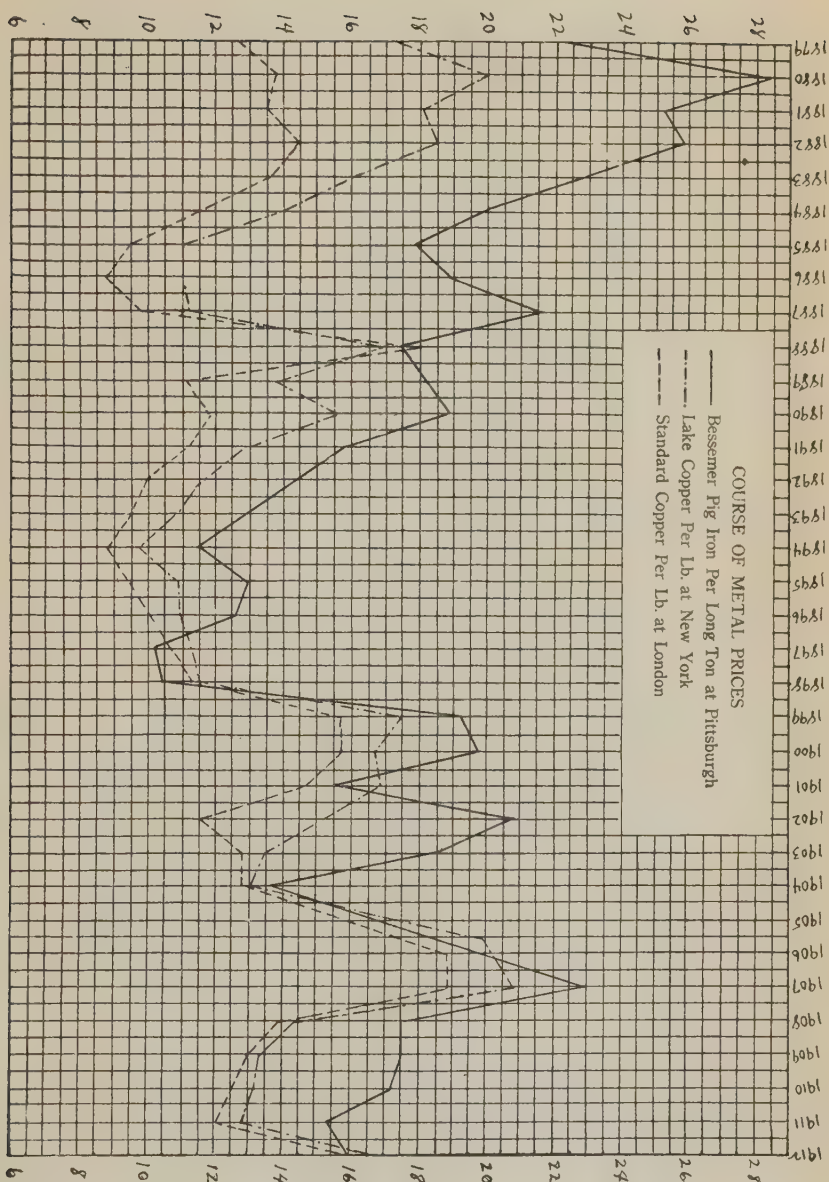
The average price received for all Lake Superior copper, from 1845 to 1912, inclusive, was 14.21 cents per pound, with average dividends of 3.56 cents per pound, leaving an estimated cost of 10.63 cents for all years. While this may be accepted as an arbitrary figure, the cost might very properly be figured materially higher. By adding \$60,000,000 to the cost of production, for money lost in unproductive ventures, the cost of copper produced would be made almost 11.5 cents per pound. By adding another \$15,000,000 for assessments on mines that have since repaid in dividends the original assessments, cost of copper would be increased to about 11.85 cents per pound, leaving a net margin of profit, for the entire production, of almost exactly 2 cents per pound, plus the present aggregate values of the mines, which would be about equal to total dividend disbursements to date, or about 3.5 cents per pound.

Omitting the production of mines that have not proven profitable, the average cost of copper produced by dividend-paying Lake Superior mines probably has been about 9.5 cents per pound, for all years.

AVERAGE AMERICAN AND ENGLISH PRICES.

The following table of average annual prices of copper in England and the United States is based upon the New York price for Lake copper and the London price for Standard copper. The two last columns give the American prices in cents and fractions and the English equivalent in sterling. English prices are for long tons of 2,240 pounds, and American prices for pounds avoirdupois, the last column, giving English equivalent of the American prices, being figured in long tons.

Year.	English Prices				American Prices.	
	Lowest.	Highest.	Fluctuation.	Average.	Average.	Average.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	Cents.	£ s. d.
1880.....	54 10 0	74 0 0	10 10 0	62 14 7	21.438	99 0 8
1881.....	57 0 0	72 10 0	15 10 0	61 16 9	18.188	84 0 8
1882.....	63 0 0	71 10 0	8 10 0	66 10 5	19.125	88 6 11
1883.....	57 0 0	67 10 0	9 10 0	62 17 11	16.500	76 3 7
1884.....	47 5 0	58 0 0	10 15 0	53 17 6	13.000	59 19 0
1885.....	38 10 0	61 12 6	23 2 6	43 11 0	10.838	49 6 5
1886.....	38 10 0	43 15 0	5 5 0	40 1 8	11.063	51 1 10
1887.....	38 7 6	85 5 0	46 17 6	46 0 6	13.850	64 0 0
1888.....	73 0 0	105 0 0	32 0 0	81 11 3	16.775	77 10 1
1889.....	35 0 0	80 0 0	45 0 0	49 14 8	13.490	62 6 5
1890.....	46 10 0	61 12 6	15 2 6	54 5 3	15.600	72 1 10
1891.....	44 1 3	56 10 0	12 8 9	51 9 4	12.760	58 19 1



AVERAGE AMERICAN AND ENGLISH PRICES (Continued.)

Year.	English Prices										American Prices.					
	Lowest.			Highest.			Fluctuation.		Average.		Average.					
	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	Cents.	£	s.	d.
1892.....	43	10	0	47	18	9	4	8	9	45	13	2	11.560	53	8	4
1893.....	40	12	6	46	16	3	6	3	9	43	15	6	10.750	49	13	10
1894.....	37	17	6	43	0	0	5	2	6	40	7	4	9.520	44	0	0
1895.....	38	13	9	47	8	9	8	15	0	42	19	7	10.730	49	12	0
1896.....	40	10	0	50	8	9	9	18	9	46	18	1	10.790	50	14	9
1897.....	47	0	0	51	15	0	4	15	0	49	2	6	11.980	52	10	2
1898.....	49	5	0	57	8	9	8	3	9	51	16	7	12.360	55	13	10
1899.....	58	1	3	79	2	6	21	1	3	73	13	9	17.050	82	0	11
1900.....	70	14	2	73	7	1	7	12	11	73	12	6	16.650	76	18	2
1901.....	47	0	0	72	17	6	25	17	6	66	19	8	16.720	77	4	7
1902.....	47	10	0	56	15	0	9	5	0	52	11	5	12.160	56	3	8
1903.....	53	13	7	64	0	7	10	7	0	58	3	2	13.720	63	4	8
1904.....	55	5	0	68	7	6	13	2	6	62	12	2	13.010	60	2	6
1905.....	64	2	6	80	12	6	16	10	0	69	9	2	15.890	73	7	9
1906.....	78	5	1	105	4	3	26	19	2	87	8	6	19.610	90	4	10
1907.....	55	0	0	113	0	0	58	0	0	84	0	0	20.004	91	19	10
1908.....	57	7	8	63	8	10	6	1	2	59	18	3	13.500	62	7	0
1909.....	54	15	0	63	17	6	9	1	6	58	15	3	13.480	62	5	10
1910.....	52	15	0	62	0	0	9	5	0	57	7	6	13.125	60	12	6
1911.....	54	0	8	62	1	3	8	0	7	56	1	9	12.779	59	0	4
1912.....	62	15	2	78	15	3	16	0	1	73	1	2	16.695	77	2	1
1913 (6 mos.)	65	4	6	71	18	5	6	13	11	67	11	3	15.769	72	16	10

PRICES OF ELECTROLYTIC COPPER.

The following table gives the average monthly prices of electrolytic wire-bars, on the New York Metal Exchange, for the years named:

(Cents.)

Month.	1905.	1906.	1907.	1908.	1909.	1910.	1911.	1912.	1913.
January	15.150	18.310	24.404	13.955	14.085	13.680	12.482	14.425	16.983
February	15.200	17.869	24.869	13.230	13.215	13.510	12.437	14.435	15.717
March	15.200	18.361	25.065	12.910	12.585	13.425	12.363	14.853	15.065
April	15.180	18.376	24.224	12.890	12.670	12.930	12.263	16.003	15.620
May	15.000	18.475	24.043	12.820	13.025	12.670	12.188	16.326	15.896
June	15.000	18.442	22.665	12.850	13.260	12.590	12.603	17.505	15.203
July	15.110	18.190	21.130	12.880	12.970	12.365	12.687	17.418	14.646
August	15.875	18.380	18.356	13.610	13.060	12.560	12.620	17.694	15.787
September	16.225	19.033	15.565	13.585	12.930	12.490	12.463	17.706	16.800
October	16.500	21.203	13.169	13.525	12.810	12.775	12.356	17.745	16.786
November	16.845	21.833	13.391	14.210	13.240	12.875	12.807	17.750	15.400
December	18.596	22.885	13.163	14.210	13.480	12.725	13.739	17.750	14.601
Yearly ave.	15.980	19.775	20.860	13.390	13.110	12.880	12.584	16.634	15.70

The prices given herein are those of actual sales of copper, reported by the American Metal Exchange. Comparison of these figures with those given in the *Engineering & Mining Journal* show the latter to be somewhat lower; as all the smelters pay for ore shipments on the *Engineering & Mining Journal* figures, the discrepancy is an important one. The writer does not know how these figures are made up, but it is evident that as the selling agencies controlled by the smelting interests, handle the latter's output, these agencies are the only source from which authentic figures of sale prices can be obtained and from which the average price must be calculated.

HIGH, LOW AND AVERAGE PRICES OF LAKE COPPER, 1860-1913.

Year..	(Cents.)		—Highest—		—Lowest—		Average.
	Price.	Month.	Price.	Month.	Price.	Month.	
1860.....	24.000	January	19.750	December	22.875		
1861.....	27.000	December	17.500	July	22.250		
1862.....	32.875	November	20.750	May	21.875		
1863.....	38.750	December	29.000	July	33.875		
1864.....	55.000	July	39.000	January	47.000		
1865.....	50.500	January	28.000	July	39.250		
1866.....	42.000	January	26.500	November	34.250		
1867.....	29.250	January	21.500	December	25.375		
1868.....	24.500	December	21.500	January	23.000		
1869.....	27.000	February	21.500	December	24.250		
1870.....	23.375	November	19.000	March	21.188		
1871.....	27.000	December	21.250	April	24.125		
1872.....	44.000	April	27.125	January	35.563		
1873.....	35.000	January	21.000	November	28.000		
1874.....	25.000	January	19.000	August	22.000		
1875.....	23.875	September	21.500	January	22.688		
1876.....	23.250	January	18.750	August	21.000		
1877.....	20.500	February	17.500	December	19.000		
1878.....	17.625	January	15.500	October	16.563		
1879.....	21.750	November	15.500	January	18.625		
1880.....	25.000	January	17.875	June	21.438		
1881.....	20.375	December	16.000	July	18.188		
1882.....	20.375	January	17.875	April	19.125		
1883.....	18.125	January	14.875	November	16.500		
1884.....	15.000	December	11.000	December	13.000		
1885.....	11.875	February	9.800	May	10.838		
1886.....	12.125	December	10.000	May	11.063		
1887.....	17.750	December	9.950	May	13.850		
1888.....	17.600	November	15.850	January	16.775		
1889.....	17.500	January	11.000	September	13.490		
1890.....	17.250	July	14.000	March	15.600		
1891.....	15.000	January	10.250	December	12.760		
1892.....	12.375	December	10.500	February	11.560		
1893.....	12.500	January	9.600	August	10.750		
1894.....	10.250	January	9.000	June	9.520		
1895.....	12.250	August	9.375	April	10.730		
1896.....	12.000	June	9.750	January	10.980		
1897.....	12.000	January	10.750	November	11.360		
1898.....	13.250	December	11.000	January	12.050		
1899.....	19.375	April	13.250	January	17.760		
1900.....	17.250	April	16.000	February	16.650		
1901.....	17.000	January	13.000	December	16.720		
1902.....	13.500	February	11.000	January	12.160		
1903.....	15.375	March	12.000	December	13.720		
1904.....	15.375	November	12.250	February	13.010		
1905.....	18.875	December	15.000	May	15.890		
1906.....	24.000	December	17.875	February	19.616		
1907.....	26.250	March	12.500	October	20.004		
1908.....	14.750	December	12.500	February	13.500		
1909.....	14.750	January	12.500	March	13.480		
1910.....	14.125	January	12.500	July	13.125		
1911.....	14.250	December	12.250	June	12.779		
1912.....	18.000	October	14.250	January	16.695		
1913.....	17.250	October	14.500	July	16.695		

HIGH AND LOW MONTHLY PRICES OF LAKE COPPER.

YEAR	January		February		March		April		May		June	
	Highest	Lowest	Highest	Lowest	Highest	Lowest	Highest	Lowest	Highest	Lowest	Highest	Lowest
1860.....	24	23½	24	23½	23¾	23	23½	23	23½	22¾	22½	21¾
1861.....	20	19	19½	19	19½	19½	19½	19	19½	19½	19	18
1862.....	28	27	28	25	25	23	23	21½	21½	20¾	23	20¾
1863.....	35	31	37	35	37	31	31	30	30½	30	30½	30
1864.....	41½	39	42	41½	42½	41½	44	42½	44	43	49	44
1865.....	50½	46	46	44	44½	34	35	34	34	30	30½	28½
1866.....	42	38	38	35½	35½	29½	30	28½	31	29	33	31
1867.....	29½	27	27½	27½	27½	24	24½	23½	24½	24	24½	24
1868.....	23½	21½	24	22½	24	23½	24½	23½	24½	24	24	23½
1869.....	26½	23½	27	26	26½	24	24	23½	24½	23½	23½	22
1870.....	22	21½	21½	20½	20½	19	19½	19½	19½	19	20½	19
1871.....	22½	22	22½	21½	22	21½	21½	21½	21½	21½	21½	21½
1872.....	28½	27½	28½	28½	30½	28½	44	30½	42	36	34½	33
1873.....	35	32½	35	34	35	34½	34½	30½	33½	32	31½	29½
1874.....	25	24½	25	24½	24½	24	25	24½	25	24½	24½	24½
1875.....	23½	21½	22½	21½	21½	21½	21½	23½	23½	22½	23	23
1876.....	23½	23	22½	22½	22½	22	22½	22	22½	21	21	19¾
1877.....	19½	19	20½	19½	19½	19	19½	19½	19½	19	19½	19
1878.....	17½	17½	17½	17½	17½	16½	17	16½	16½	16½	16½	16½
1879.....	16	15½	15½	15½	15½	15½	16	15½	16½	16	16½	16½
1880.....	25	21½	24½	24	24	22½	22½	21	21	18	18½	17½
1881.....	19½	19½	19½	19½	19½	19	19	18½	18½	18½	18½	16½
1882.....	20½	20½	20	19	19½	18½	18½	17½	18½	18	18½	18
1883.....	18½	18	17½	17½	17½	17½	16	15½	16	15½	15½	15
1884.....	15	14½	15	14½	15	14½	15	14½	14½	14½	14½	14
1885.....	11½	10½	11½	10½	11½	10½	11½	10½	11½	10½	11½	11
1886.....	11½	11½	11½	11½	11½	11½	11½	11½	11½	10	10½	10
1887.....	12	11½	11½	10½	10½	10½	10	10	10	9¾	10½	10
1888.....	17½	15½	16½	16	16½	15½	16½	16	16½	16½	16½	16½
1889.....	17½	16½	16½	16½	15½	15	16	15½	12½	12	12½	12
1890.....	14½	14½	14½	14½	14½	14	14½	14½	15½	14½	16½	15½
1891.....	15	14½	14½	14½	14½	13½	13½	13½	13½	12½	13	12½
1892.....	11	10½	10½	10½	12	10½	12	11½	12½	12	11½	11½
1893.....	12½	12½	12½	12	12	11½	11½	11½	11	11	11	10½
1894.....	10½	10	10	9½	9½	9½	9½	9½	9½	9½	9½	9
1895.....	10	9½	9½	9½	9½	9½	9½	9½	10½	9½	10½	10½
1896.....	10½	9½	11½	10	11½	10½	11	10½	11½	10½	11½	11½
1897.....	12	11½	12	11	11½	11½	11½	11½	11½	10½	11½	10½
1898.....	11	10½	11½	11½	12	11½	12½	11½	12½	12	11½	11½
1899.....	17	13½	18½	17	18	17½	19½	18	19½	18½	18½	17½
1900.....	16½	16½	16½	16	17	16½	17½	17	17½	16½	16½	16½
1901.....	17	17	17	17	17	17	17	17	17	17	17	17
1902.....	13	11	13½	12½	12½	12½	12½	12	12½	12	12½	12½
1903.....	12½	12½	13½	12½	15½	13½	15½	14½	15½	14½	15½	14
1904.....	13	12½	12½	12½	13	12½	13½	13	13½	13	13½	12½
1905.....	15½	15½	15½	15½	15½	15½	15½	15½	15	15	15	15
1906.....	19	18½	18½	17½	18½	18½	18½	18½	18½	18½	18½	18½
1907.....	25½	25	25½	25½	25½	25½	25½	25½	25½	25½	24½	24½
1908.....	14½	13½	14½	12½	13½	12½	13½	13	13½	12½	13½	12½
1909.....	14½	14	14½	12½	13½	12½	13½	13	13½	13	13½	13½
1910.....	14½	13½	14	13½	14	13½	13½	13	13½	12½	13½	12½
1911.....	13½	12½	12½	12½	12½	12½	12½	12½	12½	12½	13	12½
1912.....	14½	14½	14½	14½	15½	14½	16½	16	17	16	17½	16½
1913.....	18	16½	16½	15½	15½	15½	15½	15½	16	15½	16½	14½

HIGH AND LOW MONTHLY PRICES OF LAKE COPPER (Continued).

YEAR	July		August		September		October		November		December	
	Highest	Lowest	Highest	Lowest	Highest	Lowest	Highest	Lowest	Highest	Lowest	Highest	Lowest
1860.....	21 $\frac{1}{2}$	21 $\frac{1}{2}$	21 $\frac{1}{2}$	21 $\frac{1}{2}$	22	21 $\frac{1}{2}$	22	21 $\frac{1}{2}$	21 $\frac{1}{2}$	20 $\frac{1}{2}$	20 $\frac{1}{2}$	19 $\frac{1}{2}$
1861.....	18	17 $\frac{1}{2}$	19	17 $\frac{1}{2}$	20 $\frac{1}{2}$	19	20 $\frac{1}{2}$	20	22 $\frac{1}{2}$	20 $\frac{1}{2}$	27	22 $\frac{1}{2}$
1862.....	24 $\frac{1}{2}$	22 $\frac{1}{2}$	24 $\frac{1}{2}$	24	27	24 $\frac{1}{2}$	32 $\frac{1}{2}$	27	32 $\frac{1}{2}$	30 $\frac{1}{2}$	31 $\frac{1}{2}$	30 $\frac{1}{2}$
1863.....	32	29	31	29	32 $\frac{1}{2}$	31	34 $\frac{1}{2}$	32 $\frac{1}{2}$	38 $\frac{1}{2}$	34 $\frac{1}{2}$	38 $\frac{1}{2}$	38 $\frac{1}{2}$
1864.....	55	49	52 $\frac{1}{2}$	50	52 $\frac{1}{2}$	47 $\frac{1}{2}$	48	47	49	47	50	48 $\frac{1}{2}$
1865.....	30 $\frac{1}{2}$	28	32	30 $\frac{1}{2}$	32 $\frac{1}{2}$	31 $\frac{1}{2}$	33	32 $\frac{1}{2}$	45 $\frac{1}{2}$	33	45 $\frac{1}{2}$	39 $\frac{1}{2}$
1866.....	33 $\frac{1}{2}$	31	31	30	31 $\frac{1}{2}$	30 $\frac{1}{2}$	31	30 $\frac{1}{2}$	30 $\frac{1}{2}$	26 $\frac{1}{2}$	29	26 $\frac{1}{2}$
1867.....	26	24	26 $\frac{1}{2}$	25 $\frac{1}{2}$	27 $\frac{1}{2}$	26 $\frac{1}{2}$	26 $\frac{1}{2}$	22 $\frac{1}{2}$	23	22 $\frac{1}{2}$	23	21 $\frac{1}{2}$
1868.....	24 $\frac{1}{2}$	23 $\frac{1}{2}$	24 $\frac{1}{2}$	24	24	23 $\frac{1}{2}$	24	23	24	22 $\frac{1}{2}$	24 $\frac{1}{2}$	24 $\frac{1}{2}$
1869.....	22 $\frac{1}{2}$	21 $\frac{1}{2}$	23 $\frac{1}{2}$	21 $\frac{1}{2}$	23	22	22 $\frac{1}{2}$	22	22 $\frac{1}{2}$	22	22	21 $\frac{1}{2}$
1870.....	20 $\frac{1}{2}$	20 $\frac{1}{2}$	21 $\frac{1}{2}$	20 $\frac{1}{2}$	21 $\frac{1}{2}$	20 $\frac{1}{2}$	21 $\frac{1}{2}$	21 $\frac{1}{2}$	23 $\frac{1}{2}$	21 $\frac{1}{2}$	22 $\frac{1}{2}$	22 $\frac{1}{2}$
1871.....	22 $\frac{1}{2}$	21 $\frac{1}{2}$	23	22 $\frac{1}{2}$	22 $\frac{1}{2}$	22 $\frac{1}{2}$	23 $\frac{1}{2}$	23 $\frac{1}{2}$	24 $\frac{1}{2}$	23 $\frac{1}{2}$	27	24 $\frac{1}{2}$
1872.....	34	33	35	32 $\frac{1}{2}$	35 $\frac{1}{2}$	33	34 $\frac{1}{2}$	31 $\frac{1}{2}$	32 $\frac{1}{2}$	30 $\frac{1}{2}$	32 $\frac{1}{2}$	30 $\frac{1}{2}$
1873.....	29	26 $\frac{1}{2}$	27 $\frac{1}{2}$	27	27	25 $\frac{1}{2}$	25 $\frac{1}{2}$	24	24	21	25	23
1874.....	24 $\frac{1}{2}$	20	21	19	21 $\frac{1}{2}$	21	22 $\frac{1}{2}$	21 $\frac{1}{2}$	23 $\frac{1}{2}$	22 $\frac{1}{2}$	23 $\frac{1}{2}$	23 $\frac{1}{2}$
1875.....	23	22 $\frac{1}{2}$	23 $\frac{1}{2}$	23	23 $\frac{1}{2}$	23 $\frac{1}{2}$	23 $\frac{1}{2}$	23	23 $\frac{1}{2}$	23	23 $\frac{1}{2}$	23 $\frac{1}{2}$
1876.....	20	19	19 $\frac{1}{2}$	18 $\frac{1}{2}$	21	18 $\frac{1}{2}$	21 $\frac{1}{2}$	20 $\frac{1}{2}$	20 $\frac{1}{2}$	20	20	19 $\frac{1}{2}$
1877.....	19 $\frac{1}{2}$	19	19	17 $\frac{1}{2}$	18 $\frac{1}{2}$	17 $\frac{1}{2}$	18	17 $\frac{1}{2}$	17 $\frac{1}{2}$	17 $\frac{1}{2}$	17 $\frac{1}{2}$	17 $\frac{1}{2}$
1878.....	16 $\frac{1}{2}$	16	16	16	16 $\frac{1}{2}$	16	16	15 $\frac{1}{2}$	15 $\frac{1}{2}$	15 $\frac{1}{2}$	16	15 $\frac{1}{2}$
1879.....	16 $\frac{1}{2}$	16	16 $\frac{1}{2}$	16	17	16 $\frac{1}{2}$	21 $\frac{1}{2}$	18	21 $\frac{1}{2}$	21	21 $\frac{1}{2}$	21
1880.....	18 $\frac{1}{2}$	18 $\frac{1}{2}$	19 $\frac{1}{2}$	19	18 $\frac{1}{2}$	18 $\frac{1}{2}$	18 $\frac{1}{2}$	18 $\frac{1}{2}$	18 $\frac{1}{2}$	18 $\frac{1}{2}$	19 $\frac{1}{2}$	18 $\frac{1}{2}$
1881.....	16 $\frac{1}{2}$	16	16 $\frac{1}{2}$	16 $\frac{1}{2}$	18 $\frac{1}{2}$	16 $\frac{1}{2}$	18 $\frac{1}{2}$	18	19	18 $\frac{1}{2}$	20 $\frac{1}{2}$	19 $\frac{1}{2}$
1882.....	18 $\frac{1}{2}$	18 $\frac{1}{2}$	18 $\frac{1}{2}$	18 $\frac{1}{2}$	18 $\frac{1}{2}$	18	18 $\frac{1}{2}$	18	18 $\frac{1}{2}$	18	18	17 $\frac{1}{2}$
1883.....	15 $\frac{1}{2}$	15	15	15	15 $\frac{1}{2}$	15	15 $\frac{1}{2}$	15 $\frac{1}{2}$	15	14 $\frac{1}{2}$	15	14 $\frac{1}{2}$
1884.....	14 $\frac{1}{2}$	13 $\frac{1}{2}$	14	13 $\frac{1}{2}$	13 $\frac{1}{2}$	13	13 $\frac{1}{2}$	12 $\frac{1}{2}$	13	12 $\frac{1}{2}$	12 $\frac{1}{2}$	11
1885.....	11 $\frac{1}{2}$	10 $\frac{1}{2}$	11 $\frac{1}{2}$	11	11 $\frac{1}{2}$	10 $\frac{1}{2}$	11 $\frac{1}{2}$	10 $\frac{1}{2}$	11 $\frac{1}{2}$	10 $\frac{1}{2}$	11 $\frac{1}{2}$	11 $\frac{1}{2}$
1886.....	10 $\frac{1}{2}$	10	10 $\frac{1}{2}$	10	11 $\frac{1}{2}$	10 $\frac{1}{2}$	11 $\frac{1}{2}$	11 $\frac{1}{2}$	12	11 $\frac{1}{2}$	12 $\frac{1}{2}$	11 $\frac{1}{2}$
1887.....	10 $\frac{1}{2}$	10 $\frac{1}{2}$	10 $\frac{1}{2}$	10 $\frac{1}{2}$	11	10 $\frac{1}{2}$	12 $\frac{1}{2}$	10 $\frac{1}{2}$	14 $\frac{1}{2}$	11 $\frac{1}{2}$	17 $\frac{1}{2}$	14 $\frac{1}{2}$
1888.....	16 $\frac{1}{2}$	16 $\frac{1}{2}$	17	16 $\frac{1}{2}$	17 $\frac{1}{2}$	16 $\frac{1}{2}$	17 $\frac{1}{2}$	17 $\frac{1}{2}$	17 $\frac{1}{2}$	17 $\frac{1}{2}$	17 $\frac{1}{2}$	17 $\frac{1}{2}$
1889.....	12	12	12	12	12	11	11	11	13 $\frac{1}{2}$	11 $\frac{1}{2}$	14 $\frac{1}{2}$	14
1890.....	17 $\frac{1}{2}$	16 $\frac{1}{2}$	17 $\frac{1}{2}$	17	17	17	16 $\frac{1}{2}$	16 $\frac{1}{2}$	16 $\frac{1}{2}$	16 $\frac{1}{2}$	16	15
1891.....	12 $\frac{1}{2}$	12 $\frac{1}{2}$	12 $\frac{1}{2}$	12	12 $\frac{1}{2}$	12 $\frac{1}{2}$	12 $\frac{1}{2}$	11 $\frac{1}{2}$	11 $\frac{1}{2}$	11	11 $\frac{1}{2}$	10 $\frac{1}{2}$
1892.....	11 $\frac{1}{2}$	11 $\frac{1}{2}$	11 $\frac{1}{2}$	11 $\frac{1}{2}$	11 $\frac{1}{2}$	11 $\frac{1}{2}$	11 $\frac{1}{2}$	11 $\frac{1}{2}$	12	11 $\frac{1}{2}$	12 $\frac{1}{2}$	12 $\frac{1}{2}$
1893.....	10 $\frac{1}{2}$	10 $\frac{1}{2}$	10 $\frac{1}{2}$	9 $\frac{1}{2}$	9 $\frac{1}{2}$	9 $\frac{1}{2}$	9 $\frac{1}{2}$	9 $\frac{1}{2}$	10 $\frac{1}{2}$	9 $\frac{1}{2}$	10 $\frac{1}{2}$	10 $\frac{1}{2}$
1894.....	9 $\frac{1}{2}$	9	9 $\frac{1}{2}$	9	9 $\frac{1}{2}$	9 $\frac{1}{2}$	9 $\frac{1}{2}$	9 $\frac{1}{2}$	9 $\frac{1}{2}$	9 $\frac{1}{2}$	10	9 $\frac{1}{2}$
1895.....	11 $\frac{1}{2}$	10 $\frac{1}{2}$	12 $\frac{1}{2}$	11 $\frac{1}{2}$	12 $\frac{1}{2}$	12	12	11 $\frac{1}{2}$	11 $\frac{1}{2}$	11	11	10
1896.....	11 $\frac{1}{2}$	11	11 $\frac{1}{2}$	10 $\frac{1}{2}$	10 $\frac{1}{2}$	10 $\frac{1}{2}$	10 $\frac{1}{2}$	10 $\frac{1}{2}$	11 $\frac{1}{2}$	10 $\frac{1}{2}$	11 $\frac{1}{2}$	11 $\frac{1}{2}$
1897.....	11 $\frac{1}{2}$	11	11 $\frac{1}{2}$	11	11 $\frac{1}{2}$	11 $\frac{1}{2}$	11 $\frac{1}{2}$	11	11	10 $\frac{1}{2}$	11	10 $\frac{1}{2}$
1898.....	11 $\frac{1}{2}$	11 $\frac{1}{2}$	12 $\frac{1}{2}$	11 $\frac{1}{2}$	12 $\frac{1}{2}$	12 $\frac{1}{2}$	12 $\frac{1}{2}$	11 $\frac{1}{2}$	12 $\frac{1}{2}$	11 $\frac{1}{2}$	12 $\frac{1}{2}$	12 $\frac{1}{2}$
1899.....	18 $\frac{1}{2}$	18 $\frac{1}{2}$	18 $\frac{1}{2}$	18 $\frac{1}{2}$	18 $\frac{1}{2}$	18 $\frac{1}{2}$	18 $\frac{1}{2}$	17	17 $\frac{1}{2}$	17	17	16 $\frac{1}{2}$
1900.....	16 $\frac{1}{2}$	16 $\frac{1}{2}$	16 $\frac{1}{2}$	16 $\frac{1}{2}$	16 $\frac{1}{2}$	16 $\frac{1}{2}$	16 $\frac{1}{2}$	16 $\frac{1}{2}$	16 $\frac{1}{2}$	16 $\frac{1}{2}$	17	16 $\frac{1}{2}$
1901.....	17	16 $\frac{1}{2}$	16 $\frac{1}{2}$	16 $\frac{1}{2}$	16 $\frac{1}{2}$	16 $\frac{1}{2}$	16 $\frac{1}{2}$	16 $\frac{1}{2}$	16 $\frac{1}{2}$	16 $\frac{1}{2}$	17	13
1902.....	12 $\frac{1}{2}$	12	12 $\frac{1}{2}$	11 $\frac{1}{2}$	12 $\frac{1}{2}$	11 $\frac{1}{2}$	12 $\frac{1}{2}$	11 $\frac{1}{2}$	12	11 $\frac{1}{2}$	12	11 $\frac{1}{2}$
1903.....	14 $\frac{1}{2}$	13	13 $\frac{1}{2}$	13	13 $\frac{1}{2}$	13 $\frac{1}{2}$	14	13	13 $\frac{1}{2}$	12 $\frac{1}{2}$	12 $\frac{1}{2}$	12
1904.....	12 $\frac{1}{2}$	12 $\frac{1}{2}$	12 $\frac{1}{2}$	12 $\frac{1}{2}$	13	12 $\frac{1}{2}$	14	12 $\frac{1}{2}$	15 $\frac{1}{2}$	13 $\frac{1}{2}$	15 $\frac{1}{2}$	14 $\frac{1}{2}$
1905.....	15 $\frac{1}{2}$	15	16 $\frac{1}{2}$	15 $\frac{1}{2}$	16 $\frac{1}{2}$	16 $\frac{1}{2}$	16 $\frac{1}{2}$	16 $\frac{1}{2}$	17 $\frac{1}{2}$	16 $\frac{1}{2}$	18 $\frac{1}{2}$	17 $\frac{1}{2}$
1906.....	18 $\frac{1}{2}$	18 $\frac{1}{2}$	18 $\frac{1}{2}$	18 $\frac{1}{2}$	20 $\frac{1}{2}$	18 $\frac{1}{2}$	22 $\frac{1}{2}$	20 $\frac{1}{2}$	22 $\frac{1}{2}$	22 $\frac{1}{2}$	24	22 $\frac{1}{2}$
1907.....	24 $\frac{1}{2}$	22 $\frac{1}{2}$	22 $\frac{1}{2}$	20	19 $\frac{1}{2}$	15 $\frac{1}{2}$	15 $\frac{1}{2}$	12 $\frac{1}{2}$	14 $\frac{1}{2}$	13 $\frac{1}{2}$	14	13 $\frac{1}{2}$
1908.....	13 $\frac{1}{2}$	12 $\frac{1}{2}$	14	13 $\frac{1}{2}$	14	13 $\frac{1}{2}$	14	13 $\frac{1}{2}$	14 $\frac{1}{2}$	14	14 $\frac{1}{2}$	14 $\frac{1}{2}$
1909.....	13 $\frac{1}{2}$	13 $\frac{1}{2}$	13 $\frac{1}{2}$	13 $\frac{1}{2}$	13 $\frac{1}{2}$	13	13 $\frac{1}{2}$	12 $\frac{1}{2}$	13 $\frac{1}{2}$	13	13	12 $\frac{1}{2}$
1910.....	12 $\frac{1}{2}$	12 $\frac{1}{2}$	13	12 $\frac{1}{2}$	13	12 $\frac{1}{2}$	13 $\frac{1}{2}$	12 $\frac{1}{2}$	13 $\frac{1}{2}$	13	13	12 $\frac{1}{2}$
1911.....	13	12 $\frac{1}{2}$	13	12 $\frac{1}{2}$	12 $\frac{1}{2}$	12 $\frac{1}{2}$	12 $\frac{1}{2}$	12 $\frac{1}{2}$	13 $\frac{1}{2}$	12 $\frac{1}{2}$	14 $\frac{1}{2}$	12 $\frac{1}{2}$
1912.....	17 $\frac{1}{2}$	17	17 $\frac{1}{2}$	17 $\frac{1}{2}$	17 $\frac{1}{2}$	17 $\frac{1}{2}$	18	17 $\frac{1}{2}$	17 $\frac{1}{2}$	17 $\frac{1}{2}$	17 $\frac{1}{2}$	17 $\frac{1}{2}$
1913.....	15 $\frac{1}{2}$	14 $\frac{1}{2}$	16 $\frac{1}{2}$	15 $\frac{1}{2}$	17	16 $\frac{1}{2}$	17 $\frac{1}{2}$	16 $\frac{1}{2}$	17 $\frac{1}{2}$	15	15 $\frac{1}{2}$	15

CONVERSION TABLE FOR AMERICAN AND ENGLISH PRICES.

This table gives the equivalents, in American and English currency, for the prices of copper, from £35 to £150 per ton. The American basis of weight is the avoirdupois pound; the English basis is the long ton of 2,240 pounds avoirdupois. The rate of exchange is figured at £1=\$4.85:

(Pounds Sterling and Cents.)

£35..... 7.58c.	£64.....13.86c.	£ 93.....20.14c.	£122.....26.41c.
£36..... 7.80c.	£65.....14.07c.	£ 94.....20.35c.	£123.....27.62c.
£37..... 8.01c.	£66.....14.29c.	£ 95.....20.57c.	£124.....27.85c.
£38..... 8.23c.	£67.....14.51c.	£ 96.....20.79c.	£125.....27.06c.
£39..... 8.45c.	£68.....14.72c.	£ 97.....21.00c.	£126.....27.28c.
£40..... 8.66c.	£69.....14.94c.	£ 98.....21.22c.	£127.....27.50c.
£41..... 8.88c.	£70.....15.16c.	£ 99.....21.43c.	£128.....27.71c.
£42..... 9.10c.	£71.....15.37c.	£100.....21.65c.	£129.....27.93c.
£43..... 9.31c.	£72.....15.59c.	£101.....21.87c.	£130.....28.14c.
£44..... 9.53c.	£73.....15.81c.	£102.....22.08c.	£131.....28.36c.
£45..... 9.75c.	£74.....16.02c.	£103.....22.30c.	£132.....28.58c.
£46..... 9.96c.	£75.....16.24c.	£104.....22.52c.	£133.....28.80c.
£47.....10.13c.	£76.....16.46c.	£105.....22.73c.	£134.....29.01c.
£48.....10.39c.	£77.....16.67c.	£106.....22.95c.	£135.....29.23c.
£49.....10.61c.	£78.....16.89c.	£107.....23.16c.	£136.....29.45c.
£50.....10.83c.	£79.....17.10c.	£108.....23.38c.	£137.....29.66c.
£51.....11.04c.	£80.....17.32c.	£109.....23.60c.	£138.....29.88c.
£52.....11.26c.	£81.....17.54c.	£110.....23.82c.	£139.....30.10c.
£53.....11.48c.	£82.....17.75c.	£111.....24.03c.	£140.....30.31c.
£54.....11.69c.	£83.....17.97c.	£112.....24.25c.	£141.....30.53c.
£55.....11.91c.	£84.....18.19c.	£113.....24.47c.	£142.....30.75c.
£56.....12.12c.	£85.....18.40c.	£114.....24.68c.	£143.....30.96c.
£57.....12.34c.	£86.....18.62c.	£115.....24.90c.	£144.....31.18c.
£58.....12.56c.	£87.....18.84c.	£116.....25.12c.	£145.....31.39c.
£59.....12.77c.	£88.....19.05c.	£117.....25.33c.	£146.....31.61c.
£60.....12.99c.	£89.....19.27c.	£118.....25.55c.	£147.....31.83c.
£61.....13.21c.	£90.....19.49c.	£119.....25.77c.	£148.....32.04c.
£62.....13.42c.	£91.....19.70c.	£120.....25.98c.	£149.....32.26c.
£63.....13.64c.	£92.....19.92c.	£121.....26.20c.	£150.....32.48c.

SHARE PRICES OF AMERICAN COPPER COMPANIES.

1909-1912.

Company.	1909.		1910.		1911.		1912.	
	High.	Low.	High.	Low.	High.	Low.	High.	Low.
Adventure	\$ 10.50	\$ 4.88	\$ 10.00	\$ 4.00	\$ 7.12	\$ 4.00	\$ 11.25	\$.75
Ahmeek	245.00	135.00	225.00	140.00	250.00	148.00	365.00	240.00
Algoma .....	.....	.....	14.87	7.00	11.00	2.50	8.25	2.00
Allouez	62.00	33.25	58.25	31.00	45.00	21.00	50.25	35.00
Amalgamated	96.50	65.00	90.75	55.13	71.62	44.50	92.62	60.00
Anaconda	54.38	37.75	54.00	33.50	41.12	34.25	48.00	34.50
Arizona Com'l.....	.....	.....	50.75	12.50	18.37	.10	6.87	2.00
Braden .....	.....	.....	5.06	3.31	6.00	3.69	10.75	5.00
British Columbia...	.....	.....	8.87	4.50	7.37	3.50	.....	.....
Butte Ballaklava.....	.....	.....	18.25	4.50	6.75	3.25	5.75	2.93
Calumet & Arizona...	119.00	96.25	103.00	44.75	63.75	45.00	83.50	57.50
Calumet & Hecla...	695.00	585.00	685.00	500.00	545.00	360.00	615.00	405.00
Centennial	44.50	29.00	38.00	13.50	19.00	8.00	27.50	15.00
Chino	13.12	6.50	24.00	9.50	27.50	16.37	50.25	25.00
Copper Range.....	86.75	63.50	85.00	57.50	69.75	46.50	66.50	48.25
East Butte.....	16.63	7.50	14.00	6.25	14.75	8.87	16.87	12.25
First National.....	9.75	4.75	6.63	1.38	2.87	.94	4.12	1.50
Franklin	19.00	13.00	22.50	9.00	14.00	5.50	16.00	6.75
Giroux	12.25	6.13	12.38	6.00	8.12	3.37	6.37	3.00
Granby	110.50	90.00	111.25	20.00	43.50	26.00	77.75	33.00

SHARE PRICES OF AMERICAN COPPER COMPANIES (Continued).

Company.	1909.		1910.		1911.		1912.	
	High.	Low.	High.	Low.	High.	Low.	High.	Low.
Greene Cananea.....	\$ 14.63	\$ 9.00	\$ 11.88	\$ 6.38	\$ 8.62	\$ 5.56	\$ 11.12	\$ 7.37
Hancock.....	38.00	8.25	36.00	14.75	31.50	17.00	37.00	22.00
Helvetia.....	.....	.....	5.87	1.75	2.00	.75	2.00	.70
Indiana.....	.....	.....	44.75	8.00	16.00	5.25	23.00	11.12
Inspiration Cons....	.....	.....	.....	.....	.....	.....	21.62	16.37
Isle Royale.....	33.25	22.50	28.25	13.50	23.00	11.50	37.25	20.75
Keweenaw.....	7.88	2.50	6.75	3.00	3.75	.50	3.00	.80
Lake.....	74.13	16.00	94.50	28.50	40.00	21.75	49.00	22.75
La Salle.....	19.13	10.75	19.00	6.00	6.00	3.00	8.00	4.50
Mason Valley.....	.....	.....	.....	.....	11.87	7.00	14.25	10.25
Mass.....	18.25	4.25	10.63	4.50	10.00	4.50	9.25	5.00
Mayflower.....	.....	.....	2.00	.40	3.12	.25	18.50	2.75
Miami.....	28.13	12.75	28.88	17.00	24.37	16.87	30.37	23.37
Michigan.....	.....	.....	8.50	3.50	3.50	1.25	5.50	1.62
Mohawk.....	70.50	57.50	75.25	43.00	57.00	36.00	73.00	50.50
Nevada Cons.....	30.00	16.50	27.25	17.63	21.37	15.00	24.37	18.00
New Arcadian.....	.....	.....	10.62	3.50	4.37	2.00	6.25	2.00
New Baltic.....	.....	.....	.....	.....	7.50	4.50	.....	.....
North Butte.....	85.25	47.00	50.00	18.50	36.25	20.00	39.50	22.62
North Lake.....	.....	.....	25.87	6.25	9.75	3.75	8.75	2.50
Ojibway.....	14.88	5.75	12.75	5.00	8.50	3.62	6.75	1.50
Old Colony.....	.....	.....	1.75	.25	3.12	.50	13.25	2.62
Old Dominion.....	59.00	47.25	55.00	29.50	49.00	34.25	64.00	44.00
Osceola.....	170.00	122.00	166.00	114.00	124.00	81.00	130.50	100.00
Quincy.....	96.00	84.00	92.00	66.00	76.00	55.00	95.00	72.50
Ray Cons.....	27.50	7.50	27.25	15.25	19.00	12.00	24.12	16.00
Santa Fe.....	.....	.....	2.50	1.25	1.75	.75	4.87	1.00
Shannon.....	17.88	13.50	18.00	8.75	12.25	7.00	17.87	9.00
South Lake.....	.....	.....	15.25	4.13	9.87	3.50	11.50	5.12
South Utah Mines..	.....	.....	3.50	1.06	1.06	.50	1.25	.25
Superior.....	67.00	33.88	68.25	35.00	42.75	20.00	48.87	24.00
Superior & Boston..	18.50	12.00	18.00	4.63	8.25	2.25	4.87	1.00
Tamarack.....	90.00	62.00	78.00	45.00	52.00	20.00	51.00	26.00
Tennessee.....	49.00	33.50	40.63	19.75	43.50	35.25	46.75	35.12
Tuolumne.....	.....	.....	.....	.....	5.18	2.50	4.75	2.50
U. S. Smelting, pfd.	54.00	44.00	53.13	45.75	49.50	45.25	52.75	47.00
U. S. Smelting, com.	59.00	39.00	55.00	30.00	40.12	30.37	51.00	34.00
Utah Apex.....	.....	.....	5.12	2.00	3.37	2.00	3.25	1.75
Utah Cons.....	49.75	37.25	46.00	12.50	20.00	9.50	20.50	9.50
Utah Copper.....	67.25	39.75	60.50	39.38	57.50	38.50	67.37	52.50
Victoria.....	6.00	3.00	5.75	2.00	4.25	1.00	5.87	1.75
Winona.....	13.25	4.75	15.00	5.00	9.50	3.75	7.87	3.12
Wolverine.....	158.00	139.00	150.00	102.00	122.00	74.00	117.00	65.00

DIVIDENDS OF AMERICAN COPPER MINES.

Company.	1909.	1910.	1911.	1912.	Total.
Ahmek.....	.....	.....	\$ 100,000	\$ 900,000	\$ 1,000,000
Anaconda.....	\$ 2,400,000	\$ 6,930,000	8,603,750	10,831,250	69,020,625
Arizona.....	573,860	1,042,591	1,043,952	1,043,844	16,583,529
Atlantic.....	.....	.....	.....	.....	990,000
Baltic.....	1,000,000	1,000,000	500,000	700,000	7,750,000
Bingham-New Haven..	.....	.....	251,577	68,607	434,509
Boston & Montana.....	1,800,000	2,100,000	800,000	.....	63,225,000
Bullwhacker.....	.....	.....	.....	.....	10,000
Butte-Alex Scott.....	.....	.....	.....	75,000	75,000
Butte-Ballaklava.....	.....	125,000	.....	.....	125,000
Butte & Boston.....	.....	.....	.....	.....	1,800,000

DIVIDENDS OF AMERICAN COPPER MINES (Continued).

Company.	1909.	1910.	1911.	1912.	Total.
Butte Coalition.....	\$ 250,000	\$ 1,000,000	\$ 1,000,000	\$	\$ 4,700,000
Calumet & Arizona.....	800,000	600,000	1,657,024	2,542,781	16,231,450
Calumet & Hecla.....	2,700,000	2,900,000	2,400,000	4,200,000	119,100,000
Chrisa .....	.....	.....	.....	.....	60,000
Centennial-Eureka .....	.....	600,000	600,000	300,000	3,600,000
Central .....	.....	.....	.....	.....	2,130,000
Champion	500,000	900,000	500,000	1,100,000	7,500,000
Cliff .....	.....	.....	.....	.....	2,518,620
Columbus Cons.....	.....	.....	.....	.....	212,623
Colusa-Parrot .....	.....	.....	.....	.....	1,760,000
Copper Falls .....	.....	.....	.....	.....	100,000
Cumberland-Ely .....	.....	390,000	.....	.....	390,000
Dalton & Lark.....	.....	.....	.....	.....	350,000
Daly-West	162,000	162,000	162,000	216,000	6,579,000
Ducktown .....	.....	.....	50,000	10,000	1,000,600
Franklin .....	.....	.....	.....	.....	1,240,000
Granby	270,000	270,000	148,481	.....	4,048,659
Greene Cons.....	.....	.....	.....	.....	7,450,580
Horn Silver .....	.....	.....	.....	.....	5,642,000
Imperial .....	.....	.....	.....	.....	300,000
Iron Silver	50,000	200,000	100,000	200,000	4,650,000
Jimulco	60,000	60,000	10,000	30,000	1,005,000
Kearsarge .....	.....	.....	.....	.....	160,000
Le Roi No. 2.....	115,200	180,000	150,000	30,000	1,411,200
Mammoth .....	.....	.....	.....	60,000	2,280,000
Miami .....	.....	.....	.....	1,105,572	1,105,572
Minesota .....	.....	.....	.....	.....	1,820,000
Mohawk	309,000	200,000	175,000	350,000	2,675,000
Montana O. P. Co.....	.....	.....	.....	.....	9,448,119
Mountain .....	.....	.....	.....	.....	4,216,250
National .....	.....	.....	.....	.....	320,000
Nevada Cons.....	431,700	1,726,800	2,997,548	3,998,866	10,728,405
Newhouse .....	.....	.....	.....	.....	600,000
North Butte	1,200,000	328,000	492,000	697,000	10,235,000
Old Dominion	586,488	324,000	439,866	1,173,115	3,213,428
Osceola	769,200	961,500	721,125	1,201,875	11,170,100
Parrot .....	.....	68,954	137,912	137,912	7,266,962
Pewabic .....	.....	.....	.....	.....	1,000,000
Phoenix .....	.....	.....	.....	.....	20,000
Quincy	440,000	412,500	440,000	550,000	20,430,000
Quincy (Utah).....	.....	.....	.....	.....	1,100,000
Red Bird .....	.....	.....	.....	.....	72,000
Ridge .....	.....	.....	.....	.....	100,000
Santa Rita .....	.....	.....	.....	.....	100,000
Shannon .....	.....	.....	.....	150,000	600,000
Shattuck-Arizona .....	.....	700,000	350,000	.....	1,050,000
Snowstorm	225,000	180,000	.....	75,000	1,084,670
Standard .....	.....	.....	.....	.....	69,500
Superior & Pittsburg.....	.....	.....	1,739,750	1,915,708	3,655,458
Tamarack .....	.....	.....	.....	.....	9,420,000
Tennessee	250,000	.....	300,000	500,000	3,106,250
Trimountain .....	.....	150,000	.....	300,000	1,250,000
Tuolumne .....	.....	.....	360,000	120,000	480,000
United Globe .....	.....	.....	.....	254,500	829,000
United States	2,402,476	2,403,751	2,303,172	2,492,107	15,782,600
United Verde	449,890	2,700,000	2,250,000	2,025,000	31,222,000
Utah Cons.....	600,000	150,000	150,000	450,000	7,200,000
Utah Copper	1,464,036	3,431,345	4,703,022	4,729,747	16,242,220
Wolverine	600,000	600,000	540,000	600,000	7,440,000

Totals\$19,139,850 \$35,206,441 \$26,181,179 \$45,133,884 \$541,085,829

DIVIDENDS OF AMERICAN COPPER MINES (Continued).

Company.	1909.	1910.	1911.	1912.	Total.
Amalgamated	\$ 3,077,756	\$ 3,077,758	\$ 3,077,758	\$ 6,155,516	\$ 72,812,695
Copper Range Cons.	1,536,930	1,537,340	1,357,104	788,428	12,902,248
General Development Co.		390,000	.....	.....	2,769,000
Old Dominion Co.		439,867	486,000	729,000	2,551,550
P Phelps, Dodge & Co.	5,396,652	5,399,875	5,400,000	6,750,000	22,951,527
St. Mary's M. L. Co.	160,000	160,000	480,000	480,000	3,360,000
United Copper .....		.....	.....	.....	7,625,000
Grand Totals	\$30,571,188	\$43,701,281	\$46,981,041	\$60,036,828	\$666,057,853

TOTAL LAKE SUPERIOR DIVIDENDS.

Name of Company.	Present Status.	Dates Paid— First. Last.		Number of Dividends	Total Amount.
Ahmeek	b	1911	1912	5	\$ 1,000,000
Atlantic	a	1878	1905	19	990,000
Baltic	b	1905	1912	14	7,750,000
Calumet	c	1870	1871	3	300,000
Calumet & Hecla.	b	1871	1912	160	119,100,000
Central	c	1864	1905	31	2,130,000
Champion	b	1903	1912	..	7,500,000
Cliff	d	1849	1867	37	2,518,620
Copper Falls	a	1864	1871	3	100,000
Franklin	b	1863	1894	21	1,240,000
Hecla	c	1869	1871	7	650,000
Kearsarge	e	1890	1897	3	160,000
Minesota	f	1854	1876	19	1,820,000
Mohawk	b	1906	1912	13	2,675,000
National	a	1861	1872	9	320,000
Osceola	b	1878	1912	71	11,170,100
Pewabic	g	1862	1873	11	1,000,000
Phoenix	a	1877	1877	1	20,000
Quincy	b	1862	1912	102	20,430,000
Ridge	h	1873	1880	4	100,000
Tamarack	b	1888	1907	43	9,420,000
Trimountain	b	1903	1912	4	1,250,000
Wolverine	b	1898	1912	29	7,440,000
Totals					\$199,083,720
Copper Range Cons.	i	1905	1912	36	12,902,248
Copper Range Co.	i	1905	1912	16	3,250,000
St. Mary's M. L. Co.	i	1886	1912	..	3,360,000

Grand Totals\$218,595,968

- | | |
|---------------------------------|----------------------------------|
| a. Idle. | f. Absorbed by Michigan. |
| b. Active. | g. Absorbed by Quincy. |
| c. Absorbed by Calumet & Hecla. | h. Absorbed by Mass. |
| d. Absorbed by Tamarack. | i. Not a direct copper producer. |
| e. Absorbed by Osceola. | |

DIVIDENDS OF LAKE SUPERIOR MINES.

1849-1876.

	1849.	1850.	1851.	1852.
Cliff	\$ 60,000	\$ 84,000	\$ 60,000	\$ 60,000
Totals	\$ 60,000	\$ 84,000	\$ 60,000	\$ 60,000
	1853.	1854.	1855.	1856.
Cliff	\$ 90,000	\$ 108,000	\$ 78,000	\$ 180,000
Minesota	90,000	90,000	90,000	200,000
Totals	\$ 90,000	\$ 198,000	\$ 168,000	\$ 380,000
	1857.	1858.	1859.	1860.
Cliff	\$ 180,000	\$ 160,000	\$ 180,000	\$
Minesota	300,000	300,000	180,000	120,000
Totals	\$ 480,000	\$ 460,000	\$ 360,000	\$ 120,000
	1861.	1862.	1863.	1864.
Cliff	\$ 80,000	\$ 80,000	\$ 180,000	\$ 320,000
Minesota	100,000	160,000	160,000	60,000
National	80,000	80,000	.....	80,000
Pewabic .....	.....	60,000	120,000	200,000
Quincy .....	.....	60,000	200,000	280,000
Franklin .....	.....	.....	60,000	100,000
Central .....	.....	.....	.....	50,000
Copper Falls .....	.....	.....	.....	60,000
Totals	\$ 260,000	\$ 440,000	\$ 720,000	\$ 1,150,000
	1865.	1866.	1867.	1868.
Cliff	\$ 200,000	\$ 120,000	\$ 60,000	\$
National	40,000	.....	.....	.....
Quincy	160,000	.....	.....	60,000
Franklin	60,000	.....	.....	.....
Central	50,000	50,000	50,000	40,000
Totals	\$ 510,000	\$ 170,000	\$ 110,000	\$ 100,000
	1869.	1870.	1871.	1872.
Cliff	\$	\$	\$ 100,000	\$ 100,000
Minesota .....	.....	.....	.....	50,000
National .....	.....	.....	20,000	20,000
Pewabic .....	.....	.....	20,000	40,000
Quincy	40,000	120,000	140,000	350,000
Franklin .....	.....	.....	20,000	40,000
Central	70,000	80,000	50,000	80,000
Copper Falls .....	.....	.....	40,000	.....
Hecla	100,000	300,000	250,000	.....
Calumet .....	.....	200,000	100,000	.....
Calumet & Hecla .....	.....	.....	900,000	2,400,000
Totals	\$ 210,000	\$ 700,000	\$ 1,640,000	\$ 3,080,000
	1873.	1874.	1875.	1876.
Minesota	\$	\$	\$	\$ 10,000
Pewabic	20,000	.....	.....	.....
Quincy	100,000	160,000	220,000	160,000
Central	160,000	160,000	80,000	100,000
Calumet & Hecla	2,000,000	1,600,000	1,600,000	1,600,000
Ridge	50,000	20,000	20,000	.....
Totals	\$ 2,330,000	\$ 1,940,000	\$ 1,920,000	\$ 1,870,000

DIVIDENDS OF LAKE SUPERIOR MINES (Continued).

1877-1896.

	1877.	1878.	1879.	1880.
Cliff	\$	\$	\$ 38,620	\$
Quincy	80,000	100,000	40,000	220,000
Central	140,000	100,000	80,000	100,000
Calumet & Hecla	1,600,000	1,600,000	1,600,000	2,500,000
Ridge .....	.....	.....	.....	10,000
Phoenix	20,000	.....	.....	.....
Atlantic .....	.....	20,000	.....	40,000
Osceola .....	.....	40,000	60,000	210,000
Totals	\$ 1,840,000	\$ 1,860,000	\$ 1,818,620	\$ 3,080,000

	1881.	1882.	1883.	1884.
Quincy	\$ 320,000	\$ 520,000	\$ 380,000	\$ 280,000
Franklin .....	.....	.....	.....	80,000
Central	120,000	50,000	60,000	40,000
Calumet & Hecla	2,000,000	2,000,000	2,000,000	800,000
Atlantic .....	.....	80,000	80,000	40,000
Osceola	225,000	200,000	150,000	87,500
Totals	\$ 2,665,000	\$ 2,850,000	\$ 2,670,000	\$ 1,327,500

	1885.	1886.	1887.	1888.
Quincy	\$ 180,000	\$ 240,000	\$ 200,000	\$ 360,000
Franklin	40,000	80,000	40,000	120,000
Central	30,000	40,000	40,000	70,000
Calumet & Hecla	1,700,000	1,500,000	1,000,000	2,000,000
Atlantic	20,000	40,000	40,000	120,000
Osceola .....	.....	.....	50,000	150,000
Tamarack .....	.....	.....	.....	440,000
Totals	\$ 1,970,900	\$ 1,900,000	\$ 1,370,000	\$ 3,260,000

	1889.	1890.	1891.	1892.
Quincy	\$ 280,000	\$ 320,000	\$ 450,000	\$ 350,000
Franklin	80,000	80,000	80,000	160,000
Central	40,000	20,000	20,000	.....
Calumet & Hecla	1,500,000	2,000,000	2,000,000	2,000,000
Atlantic	80,000	100,000	40,000	.....
Osceola	50,000	225,000	150,000	150,000
Tamarack	640,000	590,000	800,000	600,000
Kearsarge .....	.....	80,000	.....	.....
Totals	\$ 2,670,000	\$ 3,415,000	\$ 3,540,000	\$ 3,260,000

	1893.	1894.	1895.	1896.
Pewabic	\$ 400,000	\$	\$ 140,000	\$
Quincy	300,000	400,000	600,000	1,000,000
Franklin	120,000	80,000	.....	.....
Calumet & Hecla	2,000,000	1,500,000	2,000,000	2,500,000
Osceola	100,000	.....	100,000	125,000
Tamarack	600,000	400,000	400,000	360,000
Kearsarge .....	.....	.....	40,000	.....
Totals	\$ 3,520,000	\$ 2,380,000	\$ 3,280,000	\$ 3,985,000

DIVIDENDS OF LAKE SUPERIOR MINES (Continued).

1897-1912.

	1897.	1898.	1899.	1900.
Quincy	\$ 800,000	\$ 1,000,000	\$ 950,000	\$ 900,000
Calumet & Hecla.....	4,000,000	5,000,000	10,000,000	7,000,000
Atlantic	40,000	40,000	.....	80,000
Osceola	191,000	277,250	558,450	571,200
Tamarack	360,000	480,000	600,000	1,020,000
Kearsarge	40,000	.....	.....	.....
Wolverine .....	.....	60,000	210,000	240,000
Totals	\$ 5,431,000	\$ 6,857,250	\$ 12,318,450	\$ 9,811,200

	1901.	1902.	1903.	1904.
Quincy	\$ 900,000	\$ 700,000	\$ 550,000	\$ 500,000
Calumet & Hecla.....	4,500,000	2,500,000	3,500,000	4,000,000
Atlantic	80,000	.....	.....	.....
Osceola	576,900	.....	.....	192,300
Tamarack	1,200,000	.....	.....	90,000
Wolverine	240,000	240,000	330,000	450,000
Champion .....	.....	.....	300,000	200,000
Trimountain .....	.....	.....	300,000	.....
Totals	\$ 7,496,900	\$ 3,440,000	\$ 4,980,000	\$ 5,432,300

	1905.	1906.	1907.	1908.
Quincy	\$ 600,000	\$ 1,250,000	\$ 1,350,000	\$ 495,000
Central	160,000	.....	.....	.....
Calumet & Hecla.....	5,000,000	7,000,000	6,500,000	2,000,000
Atlantic	50,000	.....	.....	.....
Osceola	384,600	961,500	1,249,950	192,300
Tamarack	120,000	480,000	420,000	.....
Wolverine	660,000	1,020,000	1,050,000	600,000
Champion	1,000,000	1,200,000	1,000,000	500,000
Baltic	1,250,000	1,400,000	1,000,000	900,000
Mohawk .....	.....	500,000	900,000	250,000
Trimountain .....	.....	.....	.....	500,000
Totals	\$ 9,224,600	\$ 13,811,500	\$ 13,469,950	\$ 4,837,300

Copper Range Cons.....	1,536,086	2,304,810	2,304,810	1,536,740
Copper Range Co.....	300,000	600,000	450,000	300,000
St. Mary's M. L. Co.....	300,000	600,000	750,000	.....
Grand totals.....	\$ 11,360,686	\$ 17,316,310	\$ 16,974,760	\$ 6,674,040

	1909.	1910.	1911.	1912.
Quincy	\$ 440,000	\$ 412,500	\$ 440,000	\$ 550,000
Calumet & Hecla.....	2,700,000	2,900,000	2,400,000	4,200,000
Osceola	769,200	961,500	721,125	1,201,875
Wolverine	600,900	600,000	540,000	600,900
Champion	500,000	900,000	500,000	1,100,000
Baltic	1,000,000	1,000,000	500,000	700,000
Mohawk	300,000	200,000	175,000	350,000
Ahmeek			100,000	900,000

Totals	\$ 6,309,200	\$ 6,974,000	\$ 5,376,125	\$ 9,601,875
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Copper Range Cons.....	1,536,930	1,537,340	1,357,104	788,428
Copper Range Co.....	400,000	450,000	300,000	450,000
St. Mary's M. L. Co.....	160,000	160,000	480,000	480,000

Grand totals.....	\$ 8,406,130	\$ 9,121,340	\$ 7,513,229	\$ 11,320,303
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DIVIDENDS AND ASSESSMENTS OF LAKE SUPERIOR MINES.

1849-1912.

Company.	Assessments.	Dividends.	Dr. Balance.	Cr. Balance.
Adventure Cons.	\$ 2,450,000	\$.	\$ 2,450,000	\$.
Ahmeek	850,000	1,000,000		150,000
Algoma	770,000		770,000	
Albany & Boston	840,000		840,000	
Allouez	2,225,000		2,225,000	
Atlantic	1,180,000	990,000	190,000	
Arcadian	1,800,000		1,800,000	
Arnold	810,000		810,000	
Ashbeq	40,000		40,000	
Aztec	150,000		150,000	
Baltic	1,800,000	7,750,000		5,950,000
Belt	1,300,000		1,300,000	
Bohemian	180,000		180,000	
Caledonia	140,000		140,000	
Calumet & Hecla	1,200,000	119,100,000		117,900,000
Centennial (Old)	1,135,000		1,135,000	
Centennial (New)	1,755,000		1,755,000	
Central	100,000	2,130,000		2,030,000
Champion	2,500,000	7,500,000		5,000,000
Cliff (Old)	111,000	2,518,620		2,407,620
Conglomerate	1,300,000		1,300,000	
Copper Falls	1,000,000	100,000	900,000	
Copper Range Cons.	2,300,000	12,902,248		10,602,248
Delaware	2,000,000		2,000,000	
Elm River	1,200,000		1,200,000	
Evergreen Bluff	225,000		225,000	
Flint Steel	264,000		264,000	
Forrest	180,000		180,000	
Franklin	1,685,304	1,240,000	445,000	
Hancock	2,200,000		2,200,000	
Houghton	402,000		402,000	
Humboldt	120,000		120,000	
Huron	240,000		240,000	
Indiana (Old)	200,000		200,000	
Indiana (New)	840,000		840,000	
Isle Royale	2,750,000		2,750,000	
Kearsarge	180,000	160,000	20,000	
Keweenaw	3,200,000		3,200,000	
King Philip	1,300,000		1,300,000	
Lake	300,000		300,000	
La Salle	1,000,000		1,000,000	
Mass. Cons.	2,300,000		2,300,000	
Mayflower	900,000		900,000	
Michigan	2,000,000		2,000,000	
Miners	2,000,000		2,000,000	
Minesota	456,000	1,820,000		1,364,000
Mohawk	1,890,000	2,675,000		875,000
National	350,000	320,000	30,000	
New Arcadian	150,000		150,000	
Nonesuch	400,000		400,000	
North Lake	800,000		800,000	
Northwest	283,000		283,000	
Norwich	230,000		230,000	
Ohio Trap Rock	150,000		150,000	
Ojibway	1,176,000		1,176,000	
Old Colony	1,200,000		1,200,000	
Oneco	385,000		385,000	
Osceola	1,700,000	11,170,100		9,470,000

DIVIDENDS AND ASSESSMENTS OF LAKE SUPERIOR MINES. (Continued).

Company.	Assessments.	Dividends.	Dr. Balance.	Cr. Balance.
Pennsylvania	126,000	.....	126,000	.....
Peninsula	\$ 400,000	\$	\$ 400,000	\$
Pewabic	585,200	1,000,000	.....	414,800
Phoenix (Old)	1,037,500	20,000	1,017,500	.....
Phoenix Cons.	1,350,000	.....	1,350,000	.....
Quincy	200,000	20,430,000	.....	20,230,000
Ridge	470,000	100,000	370,000	.....
Rhode Island	1,050,000	.....	1,050,000	.....
St. Louis	300,000	.....	300,000	.....
South Lake	220,000	.....	220,000	.....
Superior	100,000	.....	100,000	.....
Tamarack	780,000	9,420,000	.....	8,640,000
Tamarack Junior	640,000	.....	640,000	.....
Tecumseh	500,000	.....	500,000	.....
Trimountain	2,000,000	1,250,000	750,000	.....
Toltec	500,000	.....	500,000	.....
Victoria	1,300,000	.....	1,300,000	.....
Winona	2,365,647	.....	2,365,647	.....
Wolverine	780,000	7,440,000	.....	6,660,000
Wyandot	1,100,000	.....	1,100,000	.....
Miscellaneous	10,000,000	.....	10,000,000	.....
Totals,	\$86,306,651	\$211,035,968	.....	.....
Credit balance .....	.....	.....	.....	\$125,529,317

ASSESSMENTS OF LAKE SUPERIOR MINES.

Company.	1897.	1898.	1899.	1900.
Adventure	\$	\$	\$	\$ 200,000
Allouez .....	.....	80,000	.....	.....
Arnold .....	.....	180,000	180,000	.....
Baltic	100,000	100,000	300,000	.....
Centennial	120,000	270,000	.....	270,000
Copper-Range .....	.....	.....	.....	300,000
Humboldt	20,000	.....	.....	.....
Mass .....	.....	.....	.....	200,000
Mohawk .....	.....	.....	.....	250,000
National .....	.....	200,000	.....	.....
Tecumseh	40,000	.....	.....	.....
Trimountain .....	.....	.....	.....	300,000
Union	50,000	.....	.....	.....
Washington .....	.....	8,000	.....	.....
Totals	\$ 330,000	\$ 838,000	\$ 480,000	\$1,520,000

Company.	1901.	1902.	1903.	1904.
Adventure	\$ 700,000	\$ 200,000	\$ 200,000	\$ 50,000
Allouez	300,000	.....	.....	300,000
Baltic	300,000	.....	.....	.....
Centennial	180,000	.....	.....	360,000
Mass	500,000	100,000	100,000	100,000
Michigan	100,000	200,000	300,000	.....
Mohawk	300,000	300,000	200,000	.....
Old Colony .....	.....	.....	100,000	.....
Phoenix .....	.....	100,000	100,000	100,000
Rhode Island .....	.....	100,000	.....	.....
Tecumseh	55,000	.....	.....	.....
Trimountain	200,000	300,000	.....	.....

ASSESSMENTS OF LAKE SUPERIOR MINES (Continued).

Company.	1901.	1902.	1903.	1904.
Victoria	\$	\$ 200,000	\$ 100,000	\$
Winona .....	.....	100,000	100,000	.....
Wyandot .....	.....	.....	.....	100,000
Totals	\$2,635,000	\$1,600,000	\$1,200,000	\$1,010,000

Company.	1905.	1906.	1907.	1908.
Adventure	\$	\$ 50,000	\$ 150,000	\$
Ashbed	40,000	.....	.....	.....
Centennial	360,000	.....	.....	.....
Hancock .....	.....	.....	.....	300,000
Mass	100,000	.....	.....	.....
Michigan .....	.....	.....	.....	200,000
Oneco .....	.....	30,000	.....	.....
Phoenix .....	.....	.....	150,000	.....
Rhode Island .....	.....	.....	100,000	.....
Victoria	100,000	.....	.....	.....
Winona	100,000	300,000	200,000	100,000
Wyandot .....	.....	.....	50,000	50,000
Totals	\$ 700,000	\$ 380,000	\$ 650,000	\$ 650,000

Company.	1909.	1910.	1911.	1912.
Adventure .....	.....	.....	100,000	.....
Algolah .....	.....	.....	.....	70,000
Atlantic	200,000	.....	.....	.....
Franklin .....	.....	.....	332,652	332,652
Hancock	200,000	300,000	400,000	.....
Houghton .....	.....	.....	.....	67,000
Indiana .....	.....	.....	120,000	80,000
Keweenaw	200,000	.....	.....	400,000
King Philip .....	.....	100,000	100,000	.....
Mass .....	.....	200,000	200,000	.....
Mayflower .....	.....	.....	100,000	.....
Michigan	200,000	.....	.....	.....
National	30,000	.....	.....	.....
New Arcadian	150,000	.....	.....	.....
Ojibway .....	.....	168,000	168,000	.....
Old Colony .....	.....	.....	100,000	.....
Oneco .....	.....	70,000	.....	70,000
Rhode Island .....	.....	50,000	.....	.....
St. Louis .....	.....	.....	100,000	.....
South Lake .....	.....	.....	.....	120,000
Victoria	100,000	.....	100,000	.....
Winona	300,000	100,000	165,647	.....
Wyandot .....	.....	.....	100,000	.....
Totals	\$1,380,000	\$ 988,000	\$2,086,299	\$1,139,652

CAPITALIZATION OF LAKE SUPERIOR COPPER COMPANIES.

Name of Company.	Organized under laws.	Authorized Capitalization.	No. Shares		
			Authorized.	Issued.	Unissued.
Adventure	Michigan	\$2,500,000	100,000	100,000	.....
Ahmeek	Michigan	1,250,000	50,000	50,000	.....
Algolah	Michigan	2,500,000	100,000	70,000	30,000
Allouez	Michigan	2,500,000	100,000	100,000	.....
Arnold	Michigan	2,500,000	100,000	62,000	38,000
Ashbed	Michigan	1,000,000	40,000	40,000	.....
Atlantic	Michigan	2,500,000	100,000	100,000	.....
Baltic	Michigan	2,500,000	100,000	100,000	.....
Calumet & Hecla	Michigan	2,500,000	100,000	100,000	.....
Centennial	Michigan	2,500,000	100,000	90,000	10,000
Champion	Michigan	2,500,000	100,000	100,000	.....
Cliff (New)	Michigan	2,500,000	100,000	60,000	40,000
Contact	Michigan	5,000,000	200,000	150,000	50,000
Copper Range Co.	Michigan	2,500,000	100,000	100,000	.....
Copper Range Cons.	New Jersey	39,369,200	393,692	392,901	791
Franklin	Michigan	5,000,000	200,000	166,666	33,334
Hancock	Michigan	5,000,000	200,000	100,000	100,000
Houghton	Michigan	2,500,000	100,000	67,000	33,000
Humboldt	Michigan	1,000,000	40,000	40,000	.....
Indiana	Michigan	2,500,000	100,000	80,000	20,000
Isle Royale	New Jersey	3,750,000	150,000	150,000	.....
Keweenaw	Michigan	10,000,000	400,000	200,000	200,000
Lake	Michigan	2,500,000	100,000	100,000	.....
La Salle	Michigan	10,000,000	400,000	302,977	97,023
Mass	Michigan	2,500,000	100,000	100,000	.....
Mayflower	Michigan	2,500,000	100,000	100,000	.....
Michigan	Michigan	2,500,000	100,000	100,000	.....
Mohawk	Michigan	2,500,000	100,000	100,000	.....
National	Michigan	2,500,000	100,000	75,000	25,000
Naumkeag	Michigan	5,000,000	200,000	102,000	98,000
New Arcadian	Michigan	3,750,000	150,000	150,000	.....
New Baltic	Michigan	2,500,000	100,000	70,000	30,000
North Lake	Michigan	2,500,000	100,000	100,000	.....
Ojibway	Michigan	2,500,000	100,000	84,000	16,000
Old Colony	Michigan	2,500,000	100,000	100,000	.....
Oneco	Michigan	2,500,000	100,000	70,000	30,000
Onondaga	Michigan	3,750,000	150,000	99,955	50,045
Osceola	Michigan	2,500,000	100,000	96,150	3,850
Phoenix	Michigan	2,500,000	100,000	100,000	.....
Quincy	Michigan	3,750,000	150,000	110,000	40,000
Rhode Island	Michigan	2,500,000	100,000	100,000	.....
St Mary's M. L. Co.	New Jersey	5,000,000	200,000	160,000	40,000
Seneca	Michigan	1,000,000	40,000	40,000	.....
South Lake	Michigan	2,500,000	100,000	67,919	32,081
Superior	Michigan	2,500,000	100,000	100,000	.....
Tamarack	Michigan	1,500,000	60,000	60,000	.....
Trimountain	Michigan	2,500,000	100,000	100,000	.....
Union C. L. & M. Co.	Michigan	2,500,000	100,000	80,000	20,000
Victoria	Michigan	2,500,000	100,000	100,000	.....
Winona	Michigan	5,000,000	200,000	166,667	33,333
Wolverine	Michigan	1,500,000	60,000	60,000	.....
Wyandot	Michigan	2,500,000	100,000	100,000	.....

COPPER PRODUCTION BY GROUPS.

Guggenheim Group—				
	1910.	1911.	1912.	1913.
Braden	9,000,000	9,000,000	9,500,000	16,000,000
Utah Cop.....	85,650,000	93,430,000	91,360,000	100,000,000
Nevada Con.....	65,500,000	62,840,000	63,060,000	65,000,000
Bonanza.....		20,000,000	32,000,000	30,000,000
Chino			27,770,000	54,500,000
Ray		15,700,000	35,900,000	52,600,000
Cerro de Pasco.....	34,710,000	48,600,000	50,000,000	50,000,000
Balaskala	8,450,000			
Group total.....	203,310,000	249,570,000	309,590,000	368,100,000
Cole Ryan-Standard Oil-Lewisohn; Phelps Dodge Group—				
	1910.	1911.	1912.	1913.
Anaconda	223,800,000	259,400,000	294,470,000	300,000,000
North Butte.....	25,270,000	24,820,000	26,480,000	27,000,000
Greene	45,500,000	44,900,000	47,800,000	44,700,000
Calumet & Arizona.....	54,200,000	49,950,000	53,110,000	55,000,000
Giroux			3,800,000	7,000,000
Group total.....	124,970,000	119,670,000	131,190,000	133,700,000
Phelps Dodge.....	194,140,000	180,300,000	192,300,000	190,000,000
Miami		15,390,000	32,830,000	33,000,000
Utah Con.....	7,500,000	9,160,000	6,500,000	6,000,000
	201,640,000	204,850,000	231,630,000	229,000,000
Grand total.....	550,410,000	583,920,000	657,290,000	662,700,000

1913 OUTPUT OF ELECTROLYTIC COPPER REFINERIES OF U. S.

From the Engineering & Mining Journal.

Company.	Address.	1913 Capacity, Pounds.
Nichols Cop. Co.....	Laurel Hill, N. Y.....	400,000,000
Raritan Co. Wks.....	Perth Amboy, N. J.....	400,000,000
Balt. Co. Sm. & Rolling Co.....	Canton, Md.....	348,000,000
Am. Sm. & Ref. Co.....	Perth Amboy, N. J.....	216,000,000
U. S. Metals Ref. Co.....	Chrome, N. J.....	200,000,000
Balbach Sm. & Ref. Co.....	Newark, N. J.....	48,000,000
Anac. Copper Mg. Co.....	Great Falls, Mont.....	65,000,000
Tacoma Smg. Co.....	Tacoma, Wash.....	36,000,000
Calumet & Hecla Mg. Co.....	Buffalo, N. Y.....	55,000,000
		1,768,000,000

COPPER SMELTING WORKS OF NORTH AMERICA.

Company.	Situation of Works.	No. Blast Furnaces.	Annual Capacity.	No. Reverbera- tory Furnaces.	Annual Capacity.	No. Converters.	Annual Capacity in Ore.*
American Sm. & Ref. Co.	Aguascalientes, Mex.	8	730,000	..	..	4	**
American Sm. & Ref. Co.	Perth Amboy, N. J.	3	111,000	..	..	2	**
American Sm. & Ref. Co.	Omaha, Nebr.	..	..	..	..	3	..
American Sm. & Ref. Co.	El Paso, Texas.	3	250,000	2	290,000	3	**
American Sm. & Ref. Co.	Matehuala, Mex.	3	325,000	..	..	..	..
American Sm. & Ref. Co.	Hayden, Ariz.	..	..	2	290,000	3	**
American Sm. Sec. Co.	Clifton, Utah.	4	800,000	6	875,000	6	**
American Sm. Sec. Co.	Tacoma, Wash.	3	525,000	..	..	6	**
American Sm. Sec. Co.	Velardeña, Mex.	3	227,500	..	..	..	..
Anaconda Cop. Mg. Co.	Anaconda, Mont.	3	2,190,000	8	730,000	13	123,000
Anaconda Cop. Mg. Co.	Great Falls, Mont.	5	800,000	3	225,000	3	34,500
Arizona Cop. Co.	Clifton, Ariz.	..	..	3	360,000	3	..
Balaklala Cons. Cop. Co.	Coram, Cal.	3	630,000	1	52,500	2	..
Compagnie du Boleo.	Santa Rosalia, Mex.	8	650,000	..	..	..	..
B. C. Cop. Co.	Greenwood, B. C.	3	75,000	..	..	2	..
Calumet & Arizona M. Co.	Douglas, Ariz.	2	657,000	4	365,000	6	55,000
Canadian Cop. Co.	Coppercliff, Ont.	6	840,000	2	280,000	5	..
Cananea Cons. Cop. Co.	Cananea, Mex.	8	868,000	2	153,000	5	35,000
Cons. Arizona Sm. Co.	Humboldt, Ariz.	1	130,000	1	22,000	2	5,000
Cons. M. & Sm. Co.	Trail, B. C.	5	374,000	..	..	..	..
Copper Queen Cons. C. Co.	Douglas, Ariz.	10	1,217,620	3	275,000	8	36,000
Detroit Cop. M. Co.	Morenci, Ariz.	1	132,657	..	..	3	7,578
Ducktown Sul., C. & I. Co.	Isabella, Tenn.	2	214,971	..	..	..	..
E. Butte Copper M. Co.	Butte, Mont.	2	310,250	..	..	3	7,300
Granby Cons. M., Sm. & Power Co.	Grand Forks, B. C.	8	1,440,000	..	..	3	7,000
Granby Cons. M., Sm. & Power Co.	Anyox, B. C.	3	700,000	..	..	3	..
Intern'l Sm. & Ref. Co.	Tooele, Utah.	..	..	5	456,250	5	25,450
Intern'l Sm. & Ref. Co.	Miami, Ariz.	..	..	3	262,500	5	..
Mammoth Cop. M. Co.	Kennett, Cal.	5	730,000	..	..	2	18,250
Mason Valley Mines Co.	Thompson, Nev.	2	800,000	..	..	2	22,000
Mazapil Cop. Co.	Saltillo, Mex.	4	350,000	1	52,500	4	..
Mond Nickel Co.	Coniston, Ont.	2	420,000	..	..	2	24,000
Mountain Cop. Co.	Martinez, Cal.	..	..	3	125,000	2	..
Nevada Cons. Cop. Co.	McGill, Nev.	1	175,000	5	900,000	4	40,000
Nichols Cop. Co.	Laurel Hill, N. Y.	2	94,500	..	..	2	..
Old Domin. C. M. & S. Co.	Globe, Ariz.	5	562,500	..	..	3	8,400
International Nickel Co.	Constable Hook, N. J.	2	94,500	..	..	3	..
Penn M. Co.	Campo Seco, Cal.	1	51,939	1	54,750	..	..
Pioneer Sm. Co.	Corwin, Ariz.	1	60,000	..	..	..	..
Santa Fe Gold & Cop. Co.	San Pedro, N. M.	1	52,500	..	..	..	..
Shannon Cop. Co.	Clifton, Ariz.	3	500,000	..	..	2	8,000
Swansea Cons. G. & C. M. Co.	Bouse, Ariz.	1	190,000	..	..	2	..
Tennessee Cop. Co.	Copperhill, Tenn.	7	1,000,000	..	..	4	15,700
Teziutlan C. M. & Sm. Co.	Teziutlan, Mex.	2	350,000	..	..	3	..
Cia. Metalurgica de Tor- reon	Torreón, Mex.	2	175,000	..	..	2	..
Tyee Cop. Co.	Ladysmith, B. C.	2	175,000	..	..	..	..
U. S. Sm. Co.	Midvale, Utah.	6	670,000	2	73,000	4	..
Virginia Sm. Co.	West Norfolk, Va.	1	200,000	..	..	..	..
United Verde Cop. Co.	Jerome, Ariz.	4	427,300	..	..	4	37,600
United Verde Cop. Co.	Clarkdale, Ariz.	4	840,000	3	315,000	4	..

*Raw ore smelted as flux. **Included in furnace tonnages. †Plants building.
From Engineering & Mining Journal.

AVERAGE MONTHLY PRICES OF COPPER MANUFACTURES.

(In Cts. per Pound.)

	1911.		1912.		1913.	
	Copper Wire.	Sheet Copper.	Copper Wire.	Sheet Copper.	Copper Wire.	Sheet Copper.
January	14.06	18.50	15.75	19.50	19.09	23.50
February	13.50	18.50	15.25	19.50	16.38	22.50
March	13.25	18.50	16.03	20.30	16.39	21.50
April	13.75	18.50	17.06	21.50	16.50	21.50
May	13.75	18.50	17.30	21.63	16.50	21.50
June	13.75	18.50	18.68	22.50	16.18	21.10
July	13.90	18.50	19.13	22.50	15.88	20.50
August	13.81	18.50	19.13	22.75	16.60	21.50
September	13.75	18.50	19.13	23.50	17.84	22.50
October	13.50	18.50	19.13	23.50	17.75	22.50
November	13.75	18.63	19.13	23.50	17.28	21.15
December	14.94	19.13	19.13	23.50	15.79	20.50
Year	13.81	18.56	17.96	22.02	16.85	21.69

MONTHLY AVERAGE PRICE OF COPPER.

Month.	New York								
	Electrolytic			Lake			London Standard		
	1911.	1912.	1913.	1911.	1912.	1913.	1911.	1912.	1913.
January	12.295	14.094	16.488	12.680	14.337	16.767	55.600	62.760	71.741
February	12.256	14.084	14.971	12.611	14.329	15.253	54.974	62.893	65.519
March	12.139	14.698	14.713	12.447	14.868	14.930	54.708	65.884	65.329
April	12.019	15.741	15.291	12.275	15.930	15.565	54.034	70.294	68.111
May	11.989	16.031	15.436	12.214	16.245	15.738	54.313	72.352	68.807
June	12.385	17.234	14.672	12.611	17.443	14.871	56.365	78.259	67.140
July	12.463	17.190	14.190	12.720	17.353	14.563	56.673	76.636	64.166
August	12.405	17.498	15.400	12.634	17.644	15.904	56.266	78.670	69.200
September	12.201	17.508	16.328	12.508	17.698	16.799	55.253	78.762	73.125
October	12.189	17.314	16.337	12.370	17.661	16.913	55.170	76.389	73.383
November	12.616	17.326	15.182	12.769	17.617	16.022	57.253	76.890	68.275
December	13.552	17.376	14.224	13.768	17.600	14.904	62.068	75.516	65.223
Year	12.376	16.341	15.269	12.634	16.560	15.686	55.973	72.942	68.335

New York, cts. per pound, London, pounds sterling per long ton of standard copper.

STATISTICS OF REFINED COPPER.

The accompanying table embraces the reports of the Copper Producers' Association and the stock of Standard copper, which is reported semimonthly from Europe.

Month.	United States			Visible Stocks		
	U. S. Refin'y Production.	Deliveries, Domestic.	Deliveries, for Export.	United States.	Europe.	Total.
Year, 1912..	1,581,920,287	819,665,948	746,396,452	.....	.....	.....
I, 1913.	145,479,625	65,210,030	60,383,845	105,312,582	78,491,840	183,904,422
II	130,948,881	59,676,492	72,168,523	123,198,332	77,504,000	200,702,332
III	126,251,849	76,585,471	77,699,306	122,302,890	81,244,800	203,547,690
IV	135,353,402	73,158,837	85,894,727	104,269,270	87,180,800	191,450,070
V	141,319,416	81,108,321	68,285,978	75,549,108	85,948,800	161,497,908
VI	121,860,853	68,362,571	68,067,901	67,474,225	77,235,200	144,709,425
VII ...	138,074,602	58,904,192	78,480,071	52,814,606	71,904,000	124,808,606
VIII ...	131,632,362	73,649,801	73,263,469	53,594,945	66,420,480	120,015,385
IX	131,401,229	66,836,897	73,085,275	38,314,037	63,716,800	102,030,837
X	139,070,481	68,173,720	68,123,473	29,793,094	53,625,600	83,418,692
XI	134,087,708	48,656,858	70,067,803	32,566,382	48,787,200	81,353,582
XII ...	.....	.....	.....	47,929,429	46,592,000	94,521,429

Above three tables are from the Engineering & Mining Journal.

SMELTERS' PRODUCTION OF COPPER IN THE UNITED STATES.

(In Pounds.)

State.	1910.	1911.	1912.	1913.
Alaska	5,008,171	19,412,000	32,602,000	23,360,000
Arizona	299,606,971	300,578,816	357,952,962	401,223,786
California	45,793,894	36,806,762	31,059,029	32,206,435
Colorado	10,127,012	8,474,848	7,502,000	7,320,000
Idaho	6,216,461	3,745,210	5,964,542	8,594,722
Michigan	221,400,864	216,412,867	231,628,486	161,000,000
Montana	286,242,403	271,963,769	309,247,735	284,210,911
Nevada	63,877,500	65,385,728	82,530,608	83,829,329
New Mexico	3,632,351	1,518,288	27,488,912	48,710,000
Utah	125,042,381	138,336,905	131,673,803	148,274,658
Washington			1,121,109	(a)
East and South	18,195,450	19,656,971	18,592,655	20,867,849
Other States	1,106,525	1,564,207	4,396,667	9,223,891

Totals 1,086,249,983 1,088,856,371 1,241,762,508 1,228,811,581

(a) Included in "Other States."

SMELTERS' PRODUCTION OF COPPER IN NORTH AMERICA.

(In Pounds.)

Country.	1910.	1911.	1912.	1913.
United States	1,086,249,983	1,088,856,371	1,241,762,508	1,228,811,581
Canada	52,492,282	56,370,754	75,425,575	76,250,667
Mexico	137,797,217	136,430,331	162,295,545	116,435,566
Cuba	7,799,764	8,274,563	9,684,934	7,534,010
Totals	1,284,339,246	1,284,932,019	1,489,168,562	1,429,031,824

REFINERS' PRODUCTION.

(In Pounds.)

Class.	1910.	1911.	1912.	1913 (b).
Electrolytic	1,151,624,597	1,156,627,311	1,288,333,298	1,390,000,000
Lake	221,400,864	216,412,867	231,628,486	161,000,000
Casting	32,193,196	22,977,534	24,777,266	25,000,000
Pig	46,903,463	35,920,626	37,181,237	39,000,000
Totals	1,452,122,120	1,431,938,338	1,581,920,287	1,615,000,000

(b) Estimated.

SMELTERS' PRODUCTION.

(In Pounds.)

Source.	1910.	1911.	1912.	1913.
North American ore	1,284,339,246	1,284,932,019	1,489,168,562	1,429,031,824
Foreign ore	41,976,733	34,392,091	53,701,307	59,234,779
Scrap	10,962,099	18,529,547	11,949,348	18,788,093
Totals	1,337,278,078	1,337,853,657	1,554,719,217	1,507,054,696
To foreign refiners	33,855,800	32,413,440	45,735,673	36,459,295
To American refiners	1,303,422,278	1,305,440,217	1,508,983,544	1,470,595,401
Crude copper imported	146,185,104	146,422,851	144,480,144	173,127,139
Total crude copper	1,449,607,382	1,451,863,068	1,653,463,688	1,643,722,540

CRUDE SUPPLY AND REFINED PRODUCTION.

(In Pounds.)

	1910.	1911.	1912.	1913.
Crude	1,449,607,382	1,451,863,068	1,653,463,688	1,643,722,540
Refined	1,452,122,120	1,431,938,338	1,581,920,287	1,615,000,000

Above tables are from the Engineering & Mining Journal.

PART V.

LIST OF DEAD MINING COMPANIES.

This is a list of the copper mining companies that are merged, dead, liquidated, dissolved, bankrupt or otherwise out of business. It may also include a few companies that have been inactive for years and have been reported by local authorities as dead. As complete sets of the Copper Handbook are not accessible to many readers, excerpts from former volumes, describing any company in this list, will be furnished for 50 cents each by the Copper Handbook office, Houghton, Mich.

Any errors will be gladly corrected on receipt of authentic information.

- Aberdeen C. Co. Lordsburg, N. M. See Vol. V.
 Accidental M. & M. Co. Granite, Colo. See Vol. VI.
 Acme M. & M. Co. Cotopaxi, Colo. See Vol. X.
 Adams C. Co. Saratoga, Wyo.
 Adams C. M. & Ref. Co. Steamboat Springs, Colo. See Vol. X.
 Admiral Togo-Ely C. Co. Formerly at Ely, Nev. See Vol. VIII.
 Aduddell Mines Co. Merged, 1910, in Frontenac Cons. Mines, Central City, Colo.
 Advance Dev. & M. Co. Bisbee, Ariz. See Vol. VIII.
 Aetna G. & C. M. Co. Bingham Canyon, Utah. See Vol. X.
 Aetna M. Co. Bonanza, Colo. See Vol. X.
 African Noble Duke G. & C. M. Co. Bisbee, Ariz.
 Afro-American M. & M. Co. Butte, Mont. See Vol. VIII.
 Afterthought M. Co. Lands sold to Great Western G. Co., succeeded, 1909, by Afterthought C. Co. Redding, Cal.
 Afton M. & S. Co. Helena, Mont. See Vol. V.
 Agassiz M. Co. Ray, Ariz. See Vol. VI.
 Ajax M. Co. Merged, 1909, in Gold Chain M. Co. See Vol. VIII.
 Ajo C. Co. Ajo, Ariz. See Vol. X.
 Ajo C. Mountain Mines Co. Property sold, 1907, to Rendall Ore Red. Co. See Vol. VIII.
 Ak-Sar-Ben C. Co. Merged, 1907, in Shawnee-Wyo. C. Mg. Co. Carbon, Wyo.
 Alabama G. & C. Co. Orogrande, N. M. See Vol. VIII.
 Alamo C. Co. Tucson, Ariz.
 Alamos Silver & C. Co. Succeeded by Alamos M. Co. Alamos, Mex.
 Alaska Amalgamated C. Co. Succeeded, 1907, by Alaska United C. Ex. Co.
 Alaska Cons. M. & S. Co. Was an abortive reorganization, 1907, of Alaska C. Co. Coppermount, Alaska.
 Alaska C. Ass'n. Valdez, Alaska. See Vol. VIII.
 Alaska C. Co. Ely, Nev. See Vol. VIII.
 Alaska Dev. Co. McCarthy's Creek, Alaska. See Vol. VIII.
 Alaska-Galena M. Co. Ketchikan, Alaska. See Vol. X.
 Alaska G. & C. Co. Succeeded, 1907, by Chisna Cons. Mines Co. McCarthy's Creek, Alaska.
 Alaska Imperial M. Co. Ketchikan, Alaska. See Vol. VI.
 Alaska Mines Securities Co. Hadley, Alaska. See Vol. VIII.
 Alaska M. Co. Silver City, Utah. See Vol. VIII.
 Alaska Northwest C. Co. Sidney Inlet, Victoria, B. C. See Vol. V.
 Alaska S. & R. Co. Hadley, Alaska. See Vol. VIII.
 Albayalde, Cia Min. De. Gomez del Palacio, Mex. See Vol. X.
 Alberni G. & C. Co., Ltd. Alberni, B. C. See Vol. V.
 Alessandro C. M. Co. Lands sold, 1908, to Copper Gulf M. Co. See Vol. VI.
 Alexandria G. & C. M. Co. Randsburg, Cal. See Vol. VIII.
 Algoma Commercial Co., Ltd. Property sold, 1912, to Dominion Nickel C. Co. Sault Ste. Marie.
 Alice Dev. Co. Succeeded by Alice G. Mills Corp. See Vol. IX.
 Alice G. M. Co. Chewelah, Wash. See Vol. VI.
 Allegheny M. Co. Belvidere, N. J. See Vol. VIII.
 Allen M. Co. Old Glory, Ariz. See Vol. X.
 Alliance C.-G. Co. Greenwood, B. C. See Vol. VIII.
 Alliance C. M. Co. Absorbed, 1902, by Iconoclast Cons. Mines Co., Keller, Wash.
 Alma May C. Co. Lost lands. 1908. Holmes, Wyo. See Vol. VIII.
 Alma M. & M. Co. Cañitas, Mex. See Vol. VIII.

- Almado & Terito Cons. M. Co. Succeeded by Neg. Min. de Clemente Ybarra. Alamos, Mex. See Vol. V.
- Almeda M. Co. Succeeded, 1905, by Almeda Cons. Mines Co. Galice, Ore.
- Almonte C. Co. Hanover, N. M. See Vol. VIII.
- Alpha C. Co. Property sold at sheriff's sale, June, 1912, to Geo. H. Gardner, for \$5,000 subject to \$315,000 mortgage of Manhattan Trust Co., N. Y., and \$2,500 mtge. of Camden Safe Deposit, N. Y. City. Somerville, N. J. See Vol. X.
- Alphabet C. Co. Courtland, Ariz. See Vol. VIII.
- Alsacia Dev. Co. Reorganized, 1905, as Alsacia M. Co., Fronteras, Sa. Mex.
- Alsacia M. Co. Fronteras, Mex. See Vol. VIII.
- Alta C. Co. Succeeded, 1908, by Alta Montana C. Co. Corbin, Mont.
- Alta C. Mines. Succeeded, 1909, by Boston & Alta C. Co. Corbin, Mont.
- Alta C. M. Co. Ketchum, Idaho. See Vol. VIII.
- Alta Crown C. Co. Ivanpah, Cal. See Vol. VIII.
- Alta & Hecla M. & M. Co. Merged, 1910, in South Hecla M. Co. See Vol. VIII.
- Alta M. & M. Co. Merged, 1907, in Ibex M. Co., Eureka, Utah.
- Alta M. & M. Co. Lusk, Wyo. See Vol. VIII.
- Alta Mizpah C. & G. M. Co. Alta, Utah. See Vol. VIII.
- Alta-Montana Co. Succeeded by Helena M. & Red. Co. Shares worthless.
- Alta-Montana C. Co. Succeeded, 1909, by Boston & Alta C. Co. Corbin, Mont.
- Alta-Quincy M. Co. Merged, 1906, in South Columbus M. Co. Alta, Utah.
- Alta-St. Louis M. Co. Alta, Utah. See Vol. X.
- Alta-Superior M. Co. Alta, Utah. See Vol. VIII.
- Altata M. Co. Chloride, Ariz. See Vol. X.
- Alto C. Co. Reorganized, 1909, as Cons. Mines, Smelter & Trans. Co. Patagonia, Ariz.
- Alto M. Co. Lands sold, 1908, to Leontine Cons. M. Co. Poland, Ariz.
- Alton M. Co. Needles, Cal. See Vol. X.
- Altona M. Co. Grand Forks, Idaho. See Vol. X.
- Amalgamated Arizona C. Co. at Swansea, Ariz. See Vol. X.
- Amalgamated C. M. & Extr'n. Co. Merged, 1909, in Hecla Cons. Mines Co., Hecla, Wyo.
- Amalgamated G. & C. Co. Huron, Ariz. See Vol. VI.
- Amalgamated Greenwater C. Co. Greenwater Cal. See Vol. VIII.
- Amalgamated Metal & Expl'n Co. Reorganized, 1910, as Amalgamated Metals Co. Jerome, Ariz.
- Amalgamated Metals Co. Liquidated, 1913. Jerome, Ariz.
- Amarillo M. Co. Property sold to Jarilla Cons. C. Co., 1912. Jarilla, N. M.
- Amazon-Butte C. Co. Property relinquished. Butte, Mont. See Vol. X.
- Amazon C. M. Co. Victorville, Cal. See Vol. VIII.
- Amazon-Montana Dev. Co. Property reverted to former owners. Amazon, Mont. See Vol. X.
- America-Britannia M. Co. Baring Wash.
- America M. Co., S. A. Transferred property to San Pedro C. Co., S. A. Cananea, Mex.
- American Banner C. Co. Property sold, 1910, to Inspiration C. Co., Globe, Ariz.
- American Cons. C. Co. Butte, Mont. See Vol. VIII.
- American Cons. C. Co. Santa Fé, N. M. See Vol. V.
- American C. Co. Succeeded, 1905, by American C. & G. Co., also dead. See Vol. X.
- American C. M. Co. Succeeded, 1909, by Alpha C. Co. Somerville, N. J. See Vol. VIII.
- American C. M. & Extr'n. Co. Denver, Colo. See Vol. V.
- American C. M. & S. Co. Was a swindle, promoted by J. R. Keer & Co.
- American Dev. Co. Merged, 1906, in American-Saginaw Dev. Co. See Vol. VI.
- American Dev., M. & Red. Co. Silver City, N. M. See Vol. X.
- American Eagle C. M. Co. Encampment, Wyo. See Vol. X.
- American G. & C. Co. Globe, Ariz. See Vol. X.
- American G. & C. Co. Merged, 1904, in Poland-American G. M. & M. Co. Morristown, Ariz. See Vol. XI.
- American G. & C. M. Co. Jelm, Wyo. See Vol. VI.
- American G. M. Co. of New Mexico. Nogal, N. M. See Vol. VIII.
- American Gulch M. Co. Bingham Canyon, Utah. See Vol. VIII.
- American Metals Co. Organ, N. M. See Vol. VIII.
- American Mines Dev. Ass'n. Needles, Cal. See Vol. X.
- American Mines Dev. Co., Ltd. Globe, Ariz. See Vol. VIII.
- American Mines & Expl'n Co. Hillside, Ariz. See Vol. X.
- American M. Co. Central Mine, Mich. See Vol. VIII.
- American M. Co. Callao, Utah. See Vol. VI.
- American M. Co. Monte Cristo, Wash. See Vol. X.
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- Ariz. Commercial Co. Succeeded, 1904, by Ariz. Comm. C. Co., also dead; succeeded, 1912, by Ariz. Comm. M. Co., Globe, Ariz.
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- Boston Gold-Copper Sm. Co.** Succeeded by Republic Sm. Co. Leadville, Colo. See Vol. III.
- Boston-Greenwater Cop. Co.** Greenwater, Cal. See Vol. VIII.
- Boston-Idaho M. Co.** Near Nicholia, Idaho. See Vol. X.
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- Boston & Lake Superior C. M. Co.** (Ontario.) West Superior, Wis. See Vol. X.
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- Boston & Mexico G. & C. M. Co.** Ameca, Mex. See Vol. VI.
- Boston-Miami Cop. Co.** Dissolved, by court, Nov. 9, 1912. Property now owned by Arizona-Cananea Mines Corp. See Vol. X.
- Boston-Miami Dev. Co.** Reorganized, 1910, as Boston-Miami Cop. Co. Miami, Ariz. See Vol. VIII.
- Boston & Monroe M. Co.** Schurz, Nev. See Vol. X.
- Boston & Montana Cons. C. & S. M. Co.** Dissolved, Feb., 1911. Butte, Mont. See Vol. VIII & X.
- Boston & Nevada Cop. Co.** Merged, Nov., 1904, in Nevada Cons. Copper Co. Ely, Nev. See Vol. X.
- Boston & Nevada M. Co.** Property sold, 1906, to Nevada Cop. Co. Yerington, Nev.
- Boston & New Mexico Cop. Co.** A stock-jobbing scheme. Estey, N. M. See Vol. VIII.
- Boston & Pioche M. & Dev. Co.** Succeeded, Feb., 1907, by Boston & Pioche Mg. Co. Pioche, Nev. See Vol. VIII.
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- Boston & Silverton M. & Red. Co.** Sold at sheriff's sale, Sept., 1911. Stock now worthless. Silverton, Colo. See Vol. VIII.
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- Boston & Wyoming Copper-Gold Co.** Wheatland, Wyo., and Custer, S. D. See Vol. X.
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- Bouse G. & C. Co.** Bouse, Ariz. See Vol. X.
- Bouse-Pioche G. & C. M. Co.** Bouse, Ariz. See Vol. X.
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- Bradford Dev. Co.** Vail, Ariz. See Vol. V.
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- Bradshaw Mountain Cop. M. & S. Co.** Property passed to De Soto Mg. Co. Humboldt, Ariz. See Vol. V.
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- British Columbia Expl'n, Ltd.** Succeeded, Jan., 1904, by Kamloops Mines, Ltd. Kamloops, B. C. See Vol. V.
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- British Gold Mines of Mexico, Ltd.** Torres, Sonora, Mex. See Vol. VI.
- British Mexican Copper Syn., Ltd.** Suaqui de Batuc, Mex. See Vol. VIII.
- British Yukon C. & Sil. Mg. Co.** Atlin, B. C.
- Britt Copper Co.** Aravaipa, Ariz. See Vol. X.
- Bromide Copper Co.** Tusas, New Mexico. See Vol. X.
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- Bronze Monarch M. Co., Ltd.** Merged in Mt. St. Helens Cons. Mg. Co. St. Helens, Wash.
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- well swindle. See Vol. X.
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- Buffalo-Arizona Gold Mines Co.** Turkey, Ariz. See Vol. X.
- Bull Domingo M. Co.** Succeeded, 1907, by New Bull Domingo M. & M. Co. Hecla, Wyo.
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- Bullion City Bornite C. M. & M. Co.** Aspen, Colo. See Vol. VIII.
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- Bunker Hill-Sullivan C. M. Co.** Reorganized, 1902, as Bunker Hill M. & S. Co. Index, Wash. See Vol. V.
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- Bunkerville M. Co.** Bunkerville, Nev.
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- California-Nev. C. Co. Succeeded, 1912, by Alaska-Ebner G. Mines Co. Madera, Cal. See Vol. X.
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- Calumet & Algoma Dev. Co. Succeeded, 1903, by Hermina M. Co., Ltd. Massey, Ont.
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- Calumet C. M. Co. Merged, 1907, in Kelvin-Calumet C. M. Co. Kelvin, Ariz.
- Calumet C. M. Co. Property sold, under foreclosure, to Mount St. Helens Cons. M. Co., Spirit Lake, Wash.
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- Cananea Central C. Co. Property sold to Greene-Cananea C. Co. Liquidated.
- Cananea Dev. Co. Was a Mexican subsidiary company of the Greene-Cananea C. Co. Property transferred to San Pedro C. Co., S. A., and company dissolved, 1912.
- Cananea-Duluth M. Co. Assets acquired, Feb., 1912, by Greene-Cananea C. Co. Liquidated.
- Cananea-Eastern M. Co. Arizpe, Mex. See Vol. VIII.
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- Cardenas C. Co. Absorbed, 1903, by Anita Cons. C. Co. Williams, Ariz.
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- Casa Grande C. & G. M. Co. Succeeded by Producer M. & S. Co. Casa Grande, Ariz. See Vol. VI.
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- Cascade C. M. Co. Merged, 1902, in Mt. Helens Cons. M. Co. Spirit Lake, Wash.
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- Copper World M. & S. Co. Succeeded by Copper World G. M. Co., also dead. Loomis, Wash. See Vol. IV.
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- Cowles Electric Sm. & Alum. Co. Succeeded, 1895, by Electric Sm. & Alum. Co.
- Coyote Copper Co. New York. No trace of operations secured.
- Crackerjack Cons. C. Co. Los Angeles, Cal.
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- Dorotea M. Co. Lands sold, 1905, to Pay-Cananea C. Co., Cananea, Son., Mex.
- Dos Cabezos Cons. Mines Co. Sold lands, 1907, to Mascot Copper Co., Dos Cabezos, Ariz. See Vol. VI.
- Dos Estrellas Mines & Dev. Co. Taxco de Alarcón, Guerrero, Mex. A swindle for which Geo. W. Emanuel was given a prison sentence; Louis A. Prince was arrested, but jumped a \$6,000 bail bond, and Mark J. Samuels, indicted under United States laws, stayed out of reach in Mexico. See Vol. VIII.
- Dos Naciones M. Co. Lands sold to Cananea-Duluth M. Co., Cananea, Son., Mex. See Vol. VI.
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- Kopper Krown M. Co. Merged, 1909, in Hecla Cons. Mines Co. Hecla, Wyo. See Vol. VIII.
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- Lady Greene M. & S. Co. Ferry Co., Wash. 1907.
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- Lake Superior & Pittsburg Dev. Co. Reorganized, 1904, as Lake Superior & Pittsburg M. Co. Bisbee, Ariz. See Vol. IV.
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- Las Adargas M. Co. Jiménez, Mex.
- La Sal C. M. Co. Succeeded, 1904, by Cons. La Sal M. & S. Co., La Sal, Colo.
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- Las Moras C. Co. Succeeded by Las Moras C. M. Co., also dead. Ameca, Jal., Mex. See Vols. VI and VIII.
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- Las Tablas C. Co. Aguacaliente de Baca, Mex. See Vol. VIII.
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- Last Chance M. Co. Succeeded, 1902, by Canyon C. Co. Williams, Ariz. See Vol. IV.
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- Latham M. & S. Co. Succeeded, 1905, by Ohio Lead M. & S. Co. Wells, Nev. See Vol. V.
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- Latouche Cons. C. Co. Latouche, Alaska. See Vol. X.
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- La Ventura C. Co. Forfeited N. J. charter, 1905.
- Lawrence M. Co. Operated in Houghton Co., Mich., in the 60's.
- Lawson Dev. Co. Operated in Mascota district, Jalisco, Mex., 1906-1909.
- L. B. C. M. Co. Saltillo, Mex.
- Leaclede Cons. G. & C. M. Co. North Powder, Ore.
- Lead-Silver-Copper Co. Utah. No trace of operations secured.
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- Liberal M. Co. Merged, 1903, in Butler-Liberal Cons. M. Co. Bingham Canyon, Utah.
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- Madora M. Co. Ariz. Operated in Santa Rita Mts., Ariz., 1907.
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- Manhattan C. & G. M. Co. Pioche, Nev.
- Manhattan C. M. Co. Merged, 1902, in Troy-Manhattan C. Co. Troy, Ariz.
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- Manhattan-Rambler M. Co. Manhattan, Nev.
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- Manitou M. Co. Mich. Operated in Keeweenaw Co., about 1852.
- Manitou M. & M. Co. Bonanza, Colo.
- Manner M. Co. Operated near Courtland, Ariz., about 1909.
- Manvel M. Co. Manvel, Cal.
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- Massachusetts C. Land & M. Co. No trace of operations secured.
- Massasoit G. & C. Co. No trace of operations secured.
- Mass M. Co. Mich. Succeeded, 1899, by Mass Cons. M. Co.
- Mastodon G. & C. Co. Idaho. Succeeded by Pennsylvania M. & M. Co.
- Matilda M. Co. Utah. Lands sold, 1910, to Chief Cons. M. Co.
- Matracal G. & C. M. Co. Mex. Property sold, 1909, to Indé Red'n. Co.
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- McCullough Range C. M. Co. No trace of operations secured.
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- Michoacán S. A.; Cia. Met. De Angangué, Mex.
- Michoacan C. M., Trad. & Trans. Co. Mex. Delaware charter repealed, 1905.
- Michoacán San Francisco C. Mines Syn., Ltd. Liquidated, voluntarily, 1902, Michoacán, Mex.
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- Mina Grande Cons. M. & M. Co. Forfeited N. J. charter, 1906.
- Mina Grande M. Co. Operated near San Antonio de Huerta, Mex., 1905.
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- Morelos C. Dev. Co. Maine. No trace of operations secured.
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- Mountain Gem M. Co. Saltese, Mont.
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- Mountain Lyon G. & C. Co. Operated, 1905, in the Magdalena district, Mex.
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- Old Reliable C. Co. Property sold to Calumet & Copper Creek M. Co., Copper Creek, Ariz.
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- Oregon Short Line M. Co. Sold lands to Bristol Cons. Mines Co. Pioche, Nev.
- Oregon Sm. & Ref. Co. Reorganized as Northwest Sm. & Ref. Co. Sumpter, Ore. See Vol. VIII.
- Orford Copper Co. Bayonne, N. J. Absorbed by Internat'l. Nickel Co., 1912.
- Orient Gold M. Co. Succeeded by Orient Gold Mines, Ltd. Bossburg, Wash. See Vol. X.
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- Oriole M. & M. Co. Succeeded by Metaline Oriole M. Co., 1910, Metaline, Wash.
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- Pacific Cons. M. & S. Co. Property sold, 1913, to Ely Cons. Copper Co., Nev.
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- Pacific Metals Co. Operated on Glacier Creek, Goose Bay, B. C., 1910-11.
- Pacific Mining Co. Operated in Ontonagon Co., Mich., in the 60's.
- Pacific Mng. & Metals Co. Globe, Ariz. See Vol. VI.
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- Palace G. & C. Co. Was a swindle. Wickensburg, Ariz. See Vol. VIII.
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- Palmer Mountain C. M. & M. Co. Loomis, Wash. See Vol. VIII.
- Palmer Mountain G. M. & Tun. Co. Reorganized, 1905, as Palmer Mtn. Tunnel & Power Co., a swindle, succeeded by Palmer Mtn. Tun. Co., reorganized, 1912, as Tillicum Dev. Co. See Part I. Loomis, Wash.
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- Paradise Dev. Co. Succeeded, 1907, by Paradise M. Co. Paradise, Ariz. See Vol. VI.
- Paradox C.-G. Mining Co. Absorbed, 1903, by San Juan Sm. & Ref. Co. Silverton, Colo.
- Paragon Dev. Co. Operated near Redding, Cal., 1901.
- Park City Queen M. Co. Utah. No trace of operations.
- Park City Majestic M. Co. Park City, Utah. See Vol. IV.
- Park City M. Co. Keller, Wash. See Vol. X.
- Park Copper Co. Elkhorn, Mont. See Vol. X.
- Park C. M. Co. Dillon, Mont.
- Parker-Brown M. Co. Nev. No trace of operations.
- Parker G. & C. M. Co. Parker, Ariz. See Vol. X.
- Parks Copper Mines Co. Ely, Nev.
- Parks Mining Co. Polaris, Mont.
- Parral Sm. Co. Parral, Chih., Mex. See Vol. VIII.
- Parrot M. & M. Co. Leadville, Colo. See Vol. VIII.
- Par Value Cons. G. & C. Co. Turret, Colo. See Vol. VIII.
- Paso G. & C. Producing Co. Brighton, Utah.
- Passaic Mining Co. Operated, 1847, near Bellville, N. J.
- Pass City C. Co. Ahumada, Chih., Mex. See Vol. VIII.
- Patagonia Mining Co. Succeeded by Hardshell Flux M. & Dev. Co. Owned the R. R. R. mine, under bond, 1913, to N. L. Amster.
- Patch M. & M. Co. Central City, Colo.
- Pathfinder Cons. Mines, Ltd. Grand Forks, B. C. See Vol. VIII.
- Pathfinder G. & C. Co. Atlanta, Idaho. See Vol. VIII.

- Paudorne Copper M. Co. Houston, Va. See Vol. X.
- Pay Copper Co. Greenwater, Cal. See Vol. VIII.
- Paymaster Cons. Mines Co. Succeeded, 1909, by Victoria Dev. Co. Tucson, Ariz. See Vol. VIII.
- Paymaster Copper Mining Co. Encampment, Wyo. No trace of operations.
- Paymaster Mining Co. Wash. No trace of operations.
- Paymaster M. & S. Co. Operated in Coconino Co., Ariz., 1906.
- Peach Bottom Copper Co. Elk Creek, N. C. See Vol. III.
- Peacock Copper Co. Lavie, Cal. See Vol. V.
- Peacock Copper M. & M. Co. Idaho. New Jersey charter forfeited, 1905.
- Peak Copper Co. Bessemer, Mich. See Vol. III.
- Pearl Cons. M. Co. Property, in Ferry Co., Wash., sold 1910.
- Pearl Copper M. Co. Pearl, Colo.
- Pearl C. M. & S. Co. Pearl, Colo. See Vol. VIII.
- Pearl Sm. Co. Pearl, Colo. See Vol. VI.
- Peck Mining Co. Lands passed to Great Peck M. Co. Providence, Ariz.
- Peerless C. Extraction Co. Florence, Ariz. See Vol. X.
- Peerless G. & C. M. Co. Silver Cliff, Colo. See Vol. X.
- Peerless San Juan M. Co. Silverton, Colo.
- Pellon Copper King Mines, Ariz. No trace of operations.
- Pend D'Oreille G. & C. M. Co. Davenport, Wash.
- Peninsula C. M. Co. Property sold, 1895, to Franklin M. Co., Houghton, Mich.
- Peninsula M. Co. Organized about 1846, but never operated. Houghton, Mich.
- Peninsula M. & S. Co. Lost lands, 1904. Santa Catarina, Baja Cal. Mex. See Vol. V.
- Penn-Arizona C. Co. Skull Valley, Ariz. See Vol. X.
- Penn. Chemical Works. Reorganized, 1910, as Penn Mining Co. Campo Seco, Cal. See Vol. VIII.
- Penn Mining Co. Sold lands to Lake and Cherokee Copper Co.'s. Lake Mine, Ontonagon Co., Mich. See Vol. II.
- Penn Mining Co., N. M. Succeeded, 1912, by Mulberry M. Co.
- Penn-Mont M. & M. Co. Elliston, Mont. See Vol. X.
- Pennsylvania & Arizona Cons. C. Co. Hot Springs, Ariz. See Vol. VIII.
- Pennsylvania & Cananea C. Co. Merged, 1909, in Duluth & Sonora M. Co. Cananea, Son., Mex. See Vol. VIII.
- Pennsylvania, Cananea & Globe M. Co. Globe, Ariz. See Vol. VIII.
- Pennsylvania C. Co. San Pedro, N. M. See Vol. VI.
- Pennsylvania C. M. Co. Delaware charter repealed, 1903. Was a bad egg, promoted by Paul Morris & Co. Pottstown, Pa. See Vol. VI.
- Pennsylvania M. Co. of Mich. Operated in Keweenaw county, 1861-71.
- Pennsylvania Mining Co. Merged in New England Lead-Zinc Mines Co. of N. M. Los Cerillos, N. M. See Vol. X.
- Pennsylvania M. & M. Co. Succeeded by Royal M. Co., Idaho.
- Pennsylvania & Montana M. Co. Succeeded by Western Reserve M. Co. Basin, Mont. See Vol. X.
- Percival Mining Co. Succeeded, 1898, by Percival C. M. Co., also dead. Gordon, Wis.
- Percy-Chester Cons. M. Co. Succeeded by Percy-Chester Mines Co., also dead. Red Cliff, Colo. See Vols. VIII and X.
- Perico Expl'n. Co. Mex. No trace of operations.
- Perkloemen Cons. M. Co. Shannonville, Pa.
- Permian & Trans-Pecos C. Co. Texas charter forfeited, 1905, for taxes.
- Perseverance M. Co. Owned White Pine group, Warm Springs, Mont.
- Peruvian M. & M. Co. Alta, Utah. See Vol. VIII.
- Petanque M. Co. No trace of operations.
- Petherick M. Co. Property sold, 1877, and now part of Ashbed M. Co.'s property, Mich.
- Petoskey M. Co. Williams, Ariz. See Vol. X.
- Petro M. Co. Lands sold, 1905, to Utah-Apex M. Co. Bingham Canyon, Utah.
- Pewabic M. Co. Wound up, 1905, and lands passed to Quincy M. Co. Hancock, Mich. See Vol. II.
- Pfau Gold M. & Ref. Co. Merged, 1907, in Verde River Copper Co. Jerome, Ariz.
- Phi Delta Theta C. M. Co. Dillon, Carbon Co., Wyo.
- Philadelphia & Arizona M. Co. Chloride, Mohave Co., Ariz. See Vol. VIII.
- Philadelphia & Boston M. Co. Operated in Keweenaw Co., Mich., years ago.
- Philadelphia C. & G. M., M. & Sm. Co. Organized, 1910, as La Regina M. Co. San Martin Hidalgo, Jalisco, Mex. See Vol. VIII.
- Philadelphia C. Mines Co. Sold property, 1911, for \$164,000 to United States Copper Co. N. M.
- Philadelphia M. & M. Co. Succeeded 1906, by Hillsboro Cons. Mines Co. Hillsboro, N. M.
- Phoenix Amal. C. Mines, Ltd. Phoenix, B. C. See Vol. VIII.
- Phoenix C. Co. Succeeded, by Phoenix Cons. C. Co., Mich.
- Phoenix & Eastern Sm. & Ref. Co. Phoenix, Ariz. Regarded with suspicion. See Vol. X.
- Phoenix G. & C. M. Co. Tenabo, Nev. See Vol. X.
- Phoenix M. Syn. Berlin, Wash. See Vol. VIII.
- Pic C. & G. M. Co. of Lake Superior, Ltd. Port Arthur, Ont.
- Picacho Blanco M. Co. Property passed to Cababi M. Co. Morristown, Ariz. See Vol. VIII.
- Picayune Mining Co. Payson, Utah. See Vol. X.
- Piedmont C. Co. New Jersey charter forfeited, 1904, for non-payment of taxes.
- Piedmont C. M. & S. Co. Elkton, Va. See Vol. VIII.
- Piedras Verdes M. Co. Fuerte, Sin., Mex.
- Pierce M. Co. Central City, Colo. See Vol. X.
- Pilot Butte Copper M. Co. Succeeded, 1910, by Pilot Butte M. Co. Butte, Mont. See Vol. VIII.
- Pilot Knob C. M. Co. Nev. No trace of operations.
- Pilot Ranne M. Co. Luning, Nev. See Vol. VIII.
- Pima C. M. & S. Co. Ariz. No trace of operations.
- Pinal Butte G. & C. Co. Forbestown, Cal. See Vol. VIII.

- Pinal Copper Co.** Reorganized, 1905, as Arizona Banner C. Co. Globe, Ariz. See Vol. VI.
- Pinal Mining Co.** Ariz. New Jersey charter forfeited, 1904, for non-payment of taxes.
- Pinal Mtn. C. Co., Ltd.** Globe, Ariz.
- Pinal Mtn. M. Co.** Globe, Ariz. See Vol. X.
- Pine Mtn. C. Co.** Globe, Ariz. See Vol. X.
- Pintado Copper Co.** Pintada, N. M. See Vol. X.
- Pinto Copper Co.** Santa Rita, N. M. See Vol. VIII.
- Pinto Creek C. Co.** Title changed to Arizona & Hancock M. Co., which see.
- Pinto Creek M. & S. Co., Ariz.** Succeeded, 1911, by Manitou Hill C. Co. Vol. X.
- Pioche & Arizona C. & G. M. Co.** Bouse, Ariz. See Vol. IX.
- Pioche Monitor M. Co.** Pioche, Nev.
- Pioneer C. & S. M. Co.** Oasis, Cal. See Vol. X.
- Pioneer Walker Lake G. & C. M. Co.** Yerington, Nev. See Vol. VIII.
- Piscataqua Mining Co., Mich.** Lands sold, 1853, to Bohemian M. Co.
- Pit River G., S. & C. M. Co.** Redding, Cal.
- Pitechlin Copper Co., Me.** No trace of operations.
- Pittsburg & Arizona Gold & Copper Co.** Property sold, 1912, to satisfy judgment for \$52,533. Tombstone, Ariz.
- Pittsburg & Arizona M. Co.** Johnson, Ariz. See Vol. VIII.
- Pittsburgh & Boston Copper Co.** Property sold to Tamarack M. Co. Phoenix, Mich. Described under title Cliff mine, Vol. II.
- Pittsburg & Boston Copper Harbor Co.** Operated, 1846, in Keweenaw Co., Mich.
- Pittsburg & Chippewa Co.** Operated near Lac La Belle, Mich.
- Pittsburg & Chiricahua Development Co.** Paradise, Ariz.
- Pittsburg Copper Co.** Clayton, N. M. See Vol. X.
- Pittsburg C. M. & Red. Co.** Planet, Ariz. Was a swindle by Theo. Stegner, notorious character with a prison record. See Vol. VIII.
- Pittsburg & Duluth Dev. Co.** Succeeded, 1904, by Pittsburg & Duluth M. Co. Bisbee, Ariz. See Vol. IV.
- Pittsburg & Duluth M. Co.** Merged, 1907, in Superior & Pittsburg M. Co. Bisbee, Ariz. See Vol. VI.
- Pittsburg & Greenwater C. Co.** A Dr. J. Grant Lyman swindle. Greenwater, Cal. See Vol. VIII.
- Pittsburg & Hecla Dev. Co.** Bisbee, Ariz. See Vol. V.
- Pittsburg-Idaho M. Co.** Succeeded by Pittsburg-Idaho M. & M. Co. Greer, Idaho. See Vol. VI.
- Pittsburg & Isle Royale M. Co.** Operated, 1846-1858. Isle Royale, Mich.
- Pittsburg-Jerome C. & G. M. Co.** Succeeded, 1904, by Pittsburg-Jerome C. Co. Jerome, Ariz.
- Pittsburg-Mayer M. Co.** Reorganized, 1909, as Mayer Cons. M. Co. Mayer, Ariz. See Vol. X.
- Pittsburg Mining Co.** Operated, 1852-1856, Ontonagon Co., Mich.
- Pittsburg M. & M. Co.** White Bird, Idaho.
- Pittsburg, Philadelphia & Lake Superior C. M. Co., Mich.** No trace of operations.
- Pittsburg & Portage Lake M. Co., Mich.** No trace of operations.
- Pittsburg & Sonora Dev. Co.** Cumpas, Son., Mex. See Vol. VIII.
- Pittsburg & Tennessee C. Co.** Property owned by Tennessee C. Co. Copper Hill, Tenn.
- Pittsburg & Utah G., S., C. & L. M. Co.** Ophir, Utah.
- Plute Copper Mines Co.** No trace of operations.
- Plute G. & C. M. Co.** Utah charter forfeited, 1910, for non-payment of taxes.
- Pizarro C. M. Co.** Was a swindle. Silver City, N. M. See Vol. VIII.
- Placerville C. M. & Red. Co.** Placerville, Colo. See Vol. X.
- Placerville G. & C. M. Co.** Placerville, Colo. See Vol. X.
- Plainfield C. M. Co., N. Y.** No trace of operations.
- Planet C. M. Co.** Succeeded, 1909, by New Planet C. M. Co. Planet, Ariz. See Vol. VIII.
- Plant & Callahan M. Co.** Conconully, Wash.
- Plata Cobre M. & Trans. Co.** Florence, Ariz. See Vol. VI.
- Plata C. M. Co.** Pima, Ariz.
- Platte C. M. Co.** Encampment, Wyo. See Vol. VIII.
- Pleasant View M. & M. Co.** Kellogg, Wash.
- Plenty Copper Co.** Pima, Ariz.
- Plutus Cons. M. & M. Co., Utah.** No trace of operations.
- Poland-American G. M. & M. Co.** Humboldt, Ariz. See Vol. X.
- Poland Extension G. M. & M. Co.** Merged, 1904, in Poland-American G. M. & M. Co. Formerly at Poland, Ariz. See Vol. V.
- Polk County Copper Co.** Copper Hill, Tenn. Property owned by the Tennessee C. Co.
- Polkingshorn Mining Co.** Ingot, Calif.
- Pollyton Gold M. Co.** Holmes, Wyo. See Vol. X.
- Pomeroy United C. Co.** Tonopah, Nev.
- Ponderay Copper Co.** Operated, 1908, Barker Mtn., Wash.
- Ponderosa C. Co.** Bagdad, Cal. See Vol. VIII.
- Pontiac Copper Mines, Ltd.** Changed title, 1906, to Keremeos-Pontiac Mines, Ltd. Olalla, B. C.
- Pontiac G. & C. M. Co.** Tres Piedras, N. M.
- Pontiac M. Co.** Property sold, 1895, to Quincy M. Co., Houghton, Mich.
- Porcupine Mtn. M. Co.** Succeeded, 1901, by Porcupine Mtn. Copper Co., also dead. Ontonagon, Mich.
- Portage Lake & Calumet Dev. Co.** Reorganized, 1903, as Portage Lake & Bisbee M. Co. Bisbee, Ariz.
- Portage Lake & Copper River M. Co., Mich.** No trace of operations.
- Portage Mining Co.** Succeeded, 1860, by Grand Portage M. Co. Mich.
- Portage Mining Co. of N. Y.** Operated in Houghton Co., Mich., about 1846.
- Portland Copper Co., Calumet, Mich.** Merged in Calumet & Hecla M. Co., 1871.
- Portland Copper Co.** Berlin, Wash. See Vol. X.
- Portland C. M. Co.** Rambler, Wyo. See Vol. VIII.
- Portland G. & C. M. Co.** Spirit Lake, Wash. See Vol. X.
- Portland-Imnaha C. M. Co.** Imnaha, Ore. Disincorporated, 1902, with all debts paid.

- Portland Luning C. Co. Luning, Nev. See Vol. VIII.
- Portland (Rossland) Mine, Ltd. Merged, 1904, in Velvet-Portland Mine, Ltd. Rossland, B. C. See Vol. IV.
- Portlock Harbor C. M. Co. Wash. No trace of operations.
- Porvenir De Sonora Co. Reorganized, 1902, as Coast Line Copper Co. Calera, Son., Mex.
- Postal G., Platinum & C. M. Co. Rambler, Wyo. See Vol. V.
- Postal Savings M. & M. Co. Centennial, Wyo. See Vol. VIII.
- Potomac C. Co., N. Y. No trace of operations.
- Potomac Mining Co. Dumfries, Va.
- Potosi M. Co., Ltd. Silver City, Idaho.
- Potosina; Cia. Min. Charcas, S. L. P., Mex.
- Potrillo; Cia. Min. Chañaral, Chile.
- Powers Gulch Dev. Co. Crewley, Ariz. See Vol. X.
- Premier Copper M. Co. No trace of operations or lands.
- Premier M., M. & Leasing Co. Pinos Altos, N. M. See Vol. VIII.
- President C. & G. M. Co. Boulder, Mont. See Vol. X.
- Presidential Mining Co. Owned Hosey mine, Patagonia, Ariz. See Vol. VIII.
- Preston Peak Copper Co. Yreka, Cal. West Virginia charter forfeited 1902; lands sold, 1907, by sheriff. See Vol. V.
- Pride of Arizona C. Co. Prescott, Ariz.
- Pride M. Co. Montezuma, Colo. See Vol. IV.
- Pride of the West M. & M. Co. Patagonia, Ariz. See Vol. II.
- Prince Copper Co. Bisbee, Ariz.
- Prince M. & Dev. Co., Ltd. Revelstoke, B. C. See Vol. X.
- Prince of Wales C., G. & S. M. Co. Utah charter forfeited, 1910, for unpaid taxes.
- Prince William C. Co. Valdez, Alaska. See Vol. VIII.
- Prince William Sound Amal. C. Co. Ellamar, Alas. See Vol. VIII.
- Prince William Sound M. Co. Valdez, Alas. See Vol. VIII.
- Prince William Sound M. Dev. Co. West Virginia charter forfeited, 1902, for unpaid taxes.
- Princess Royal G. & C. M. Co. Port Eslington, B. C. See Vol. VII.
- Princeton M. Co. Princeton, B. C. See Vol. X.
- Producer G. & C. M. & M. Co. Encampment, Wyo. See Vol. VIII.
- Producer M. Co. Idaho Springs, Colo. See Vol. X.
- Producer M. & S. Co. Lands reverted to former owner. Casa Grande, Ariz. See Vol. VI.
- Promontorio Cons. M. Co. Nogales, Son., Mex. See Vol. VIII.
- Promontorio M. & S. Co. Lampasos, Son., Mex.
- Promontory Signal M. Co. Promontory Point, Utah. See Vol. X.
- Pro Patria M. & M. Co. Succeeded, 1911, by Rico Mining Co., Rico, Colo.
- Prosper G. M. Co. Hillsboro, N. M.
- Protective M. Co. Succeeded, 1908, by Skagit Queen Cons. M. Co.
- Providence C. M. Co. Belen, N. M. See Vol. X.
- Providence G. & C. Co. Kelso, Cal. See Vol. X.
- Providencia G., S. & C. Mining Co. Tucson, Ariz. See Vol. VI.
- Providence M. Co., Ltd., Greenwood, Boundary district, B. C. See Vol. X.
- Prudential M. Co. Crescent City, Cal. See Vol. X.
- Prudential M. & Dev. Co. Patagonia, Ariz. See Vol. X.
- Psyche M. Co. Greenhorn, Ore. See Vol. VI.
- Pueblo Copper M. & M. Co. Johnson, Utah. See Vol. VIII.
- Puertecito Copper Co. Cananea, Son., Mex. See Vol. III.
- Puget Sound C. Co. New Jersey charter forfeited, 1903, for non-payment of taxes.
- Puget Sound Inv. Co. Van Anda, Texada Id., B. C. See Vol. III.
- Pugwash Cons. M. & S. Co. Pugwash, Nova Scotia. See Vol. VI.
- Pugwash River C. Co. Pugwash, Nova Scotia. See Vol. IV.
- Puritan Copper & Gold M. Co. Tres Piedras, N. M. See Vol. II.
- Puritan G. & C. Co. Bingham Canyon, Utah. See Vol. X.
- Pyne Smelting Co. West Alameda, Cal. See Vol. VIII.
- Pyramid Copper Co. La Sal, Utah. See Vol. VIII.
- Pyramid Copper Syn., Ltd. Dissolved, 1905. Golden, B. C. See Vol. V.
- Pyramid G. & C. M. Co. Prescott, Ariz. See Vols. V and VI.
- Pyramid Peak M. Co. Lands sold, 1905, by sheriff. Lordsburg, N. M. See Vol. VI.
- Pyrite King C. M. Co. Operated, 1904, in the Black Hills, S. D.
- Q. S. Gold M. & S. Co. Property sold, under foreclosure, 1909. Reorganized, as Q. S. Mng. Co. Conconully, Wash. See Vol. VIII.
- Quebec Copper Co., Ltd. Deadwood, B. C.
- Queen of Arizona C. Co. Merged, 1902, in Great Belcher of Ariz. Co. Providence, Ariz. See Vol. III.
- Queen Bee M. & M. Co. Succeeded, 1902, by Wyoming Queen M. Co. Jelm, Albany Co., Wyo.
- Queen Gold & Copper M. & S. Co. Wonder, Ore. See Vol. VIII.
- Queen Princess C. Co. Merged, 1909, in Copperfield Cons. M. Co. Copperfield, Colo. See Vol. VIII.
- Queen Regent C. & G. Co. Succeeded by Queen Regent Merger Mines Co. See Vol. VIII.
- Quincy & Arizona Dev. Co. Bisbee, Ariz. See Vol. IV.
- Quincy M. Co. Property sold, 1902, to Daly West M. Co. Park City, Utah.
- Rainbow Mining Co. Crown King, Ariz. See Vol. VIII.
- Rainbow Mining & Copper Co. Eureka, Cal.
- Rainbow M. & M. Co. Riddle, Ore. See Vol. X.
- Rambler Copper M. Co. Lands sold, 1903, to Lion C. M. Co. Stoddard, Ariz. See Vol. IV.
- Rambler Copper M. Co. Succeeded, 1902, by Rambler M. & S. Co. Holmes, Wyo.
- Rambler Mining Co. Rambler, Wyo. See Vol. VII.
- Rambler M. & S. Co. Succeeded, 1908, by Rambler C. & Platinum Co. Holmes, Wyo. See Vol. VII.
- Rankin Copper Mining Co. Rawlins, Wyo.
- Rattler Mining Co. Globe, Ariz. See Vol. VIII.

- Raven Mining Co.** Reorganized as Raven Copper Co. which was dissolved March, 1911. Butte, Mont. See Vol. VIII.
- Ray-Arizona Copper Co.** Ray, Ariz. See Vol. X.
- Ray Coalition Copper Co.** Supposed to have held lands near Ray, Ariz. See Vol. X.
- Ray C. Mines, Ltd.** Lands sold, 1907, to Ray Cons. C. Co. Ray, Ariz. See Vol. VI.
- Ray Extension Copper Co.** Ray, Ariz. See Vol. X.
- Ray Northern Copper Co.** Ray, Ariz. See Vol. X.
- Raymond C. & Silver M. Co.** Clancey, Mont. See Vol. X.
- Raynor Copper M. Co.** Lewis, Cal. See Vol. VI.
- Raypinto Mining Co.** Succeeded, 1910, by Calzona M. Co. Cal.
- Real Del Monte Union y Bilboa; Neg. Min.** Ojocaliente, Zacatecas, Mex.
- Realito Gold, Silver & Copper Co.** Alamos, Son., Mex.
- Realty Syn.** Succeeded by California Improvement Co. Mills College, Cal. See Vol. V.
- Red Bird M. Co.** Austin, Mont. See Vol. X.
- Red Cloud M. Co.** Salton, Cal. See Vol. VIII.
- Red Cloud M. Co.** Cananea, Son., Mex. See Vol. VIII.
- Red Fox Mining Co.** McGuigan, B. C.
- Red Gulch Gold-Copper M. & M. Co.** Merged, 1909, in Copperfield Cons. M. Co. Copperfield, Colo. See Vol. VIII.
- Red Hill M. & S. Co.** Victor, Cal. See Vol. VIII.
- Red Horse Copper Co.** Springston, Idaho. See Vol. X.
- Red Jacket & Bisbee Dev. Co.** Bisbee, Ariz. See Vol. IV.
- Red Metal M. Co.** Property sold, 1909, to Turkey Creek M. & Dev. Co. Paradise, Ariz.
- Red Metal M. Co.** Luning, Nev. See Vol. VIII.
- Red Mountain Copper-Gold M. Co.** Cisco, Cal. See Vol. IX.
- Red River Copper Co.** Red River, N. M. Owned Anaconda mine.
- Red Rock Copper Co.** Red Rock, Ariz. See Vol. X.
- Red Wing Extens. M. Co.** Title changed, March, 1906, to Massasoit M. Co. Bingham Canyon, Utah. See Vol. VI.
- Red Wing M. & M. Co.** Succeeded, 1900, by New Red Wing M. Co. Bingham Canyon, Utah.
- Redding Gold & Copper M. Co.** Redding, Cal. See Vol. X.
- Reforma Mining Co.** Fuerte, Sinaloa, Mex.
- Refugio Syn., Ltd.** Wound up and property abandoned. Cananea, Son., Mex. See Vol. X.
- Reina; Cia. Min. Ia.** Sold lands, 1907, to Mexican Mines Syn., Ltd. Cusihiuríachic, Chih., Mex. See Vol. VII.
- Reina De Cobre, S. A.; Cia. Min.** Ejutla, Oax., Mexico. See Vol. X.
- Reina De Cobre De Sonora; Cia. Min.** Caborca, and Santa Ana, Son., Mex. See Vol. VIII.
- Reliance Gold & Copper M. Co.** Turkey, Ariz. See Vol. VIII.
- Reliance Gold M. Co.** Groom Creek, Ariz. See Vol. VI.
- Reliance M. & M. Co.** Lands passed to Gem Cons. M. Co. Tenabo, Nev. See Vol. VIII.
- Reliance M. & M. Co.** Hunterstown, Pa.
- Rendall Ore Red. Co.** Lands sold to Ajo C. Co., 1909. Ajo, Ariz. See Vol. VIII.
- Republic Cons. M. & M. Co.** Idaho Springs, Colo. See Vol. VI.
- Rescue Copper Co.** Merged, 1907, in Cornelia C. Co. Ajo, Ariz. See Vol. VII.
- Reservation M. & S. Co.** Lands sold, 1907, to Dominion C. Co., Ltd. Danville, Wash.
- Resolute Copper Co.** Lands sold, 1905, to Keweenaw C. Co. Central Mine, Mich. See Vol. II.
- Restauradora M. & M. Co.** Huautla, Morelos, Mex. See Vol. X.
- Revenue M. & M. Co.** Encampment, Wyo. See Vol. VI.
- Reward Copper M. Co.** Vekol, Ariz. See Vol. X.
- Reward Gold-Copper M. Co.** Princeton Boundary district, B. C. See Vol. VIII.
- Rex Cobre M. Co.** Safford, Ariz. See Vol. VIII.
- Reyes; Cia. Min.** Los. Zitácuaro, Mich., Mex.
- Richard III Dev. Co., Ltd.** Succeeded, 1904, by Richard III M. Co. Mt. Sicker, Vancouver Id., B. C. See Vol. VI.
- Richfield Cons. M. Co.** Bingham Canyon, Utah. See Vol. IX.
- Richfield M. Co.** Succeeded, 1908, by Richfield C. Co. Querobabi, Son., Mex. See Vol. VI.
- Richmond Group Gold Mines Co.** Hillsboro, N. M. See Vol. VI.
- Richmond M. Co.** Merged, 1905, in Richmond-Eureka M. Co. Eureka, Nev.
- Rickard Ely C. Co.** Property sold, 1909, for \$84,000, to Thos. F. Cole, Ely, Nev. See Vol. VIII.
- Rigby M. & Red. Co.** Succeeded, 1910, by Mayer M. & M. Co. Mayer, Ariz. See Vol. VIII.
- Rillito Mining Co.** Tucson, Ariz.
- Rincon Mines Co.** Succeeded, 1908, by Weaver Mountain M. Co. Congress Junction, Ariz. See Vol. VIII.
- Rincon Mining Co.** Benson, Ariz. See Vol. VIII.
- Ringling Rocks Copper M. Co.** Pottstown, Pa. See Vol. X.
- Rio Arriba Cons. Mines Co.** Tres Piedras, N. M. See Vol. III.
- Rio Bacanuchi M. Co.** Bacanochi, Son., Mex. See Vol. VIII.
- Rio Hondo C. Co.** Property sold, 1900, to San Cristobal C. Co. Arroyo Seco, N. M.
- Rio Tinto Copper M. Co.** Encampment, Wyo. See Vol. VI.
- Rio Tinto Dev. Co.** Denver, Colo. Stockjobbery. See Vol. VIII.
- Rio Tinto G. & C. Co.** Prescott, Ariz. See Vol. VI.
- Rio Tinto Mexicano, Cia. Min.** Succeeded, 1908, by Rio Tinto C. Co. Terrazas, Chih., Mex. See Vol. VIII.
- Rio Tinto Mines & Sm. Co.** Terrazas, Chih., Mex. See Vol. VIII.
- Rio Tonto C. Co.** Succeeded by Rio Tonto M. & M. Co. Wickenburg, Ariz. See Vol. VIII.
- Rio Vista G. & C. M. Co.** Was a bad egg, officers having been prominent state officials of California. Fair Play, Cal. See Vol. VIII.
- Rising Sun Copper M. & S. Co.** Mt. Washington, Md.

- Rito Alto Copper Co. Hillside, Colo. See Vol. VIII.
- Riverside Copper Co. Morristown, Ariz. See Vol. VI.
- Riverside Copper M. Co., Ltd. Kootenai Co., Idaho.
- Riverton Mining & Milling Co. Shoshoni, Wyo.
- Roaring Fork M. & M. Co. Rambler, Wyo.
- Robinson Mining Co. Ely, Nev. See Vol. X.
- Robles Grande G. & C. M. Co. Goldfield, Nev. See Vol. VI.
- Roca Negra; Neg. Min. la. Mine sold, 1903, to American-Mexico M. & Dev. Co. Velardeña, Dur., Mex. See Vol. IV.
- Rochester Shoshone M. & M. Co. Shoshoni, Wyo. See Vol. VIII.
- Rociada Gold & Copper Co. Rociada, N. M.
- Rock Creek Copper M. Co., Ltd. Mullan, Idaho.
- Rock Lake M. Co., Ltd. Liquidated, 1905. Property sold to Algoma C. & Sm. Co. Bruce Mines, Algoma, Ont. See Vol. IV.
- Rocky Mountain C. Co. Encampment, Wyo. See Vol. VI.
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- Rouse-Gardner Mining Co. Central City, Colo. See Vol. VI.
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- Russell United C. Co. Property sold, 1904, to Arizona Cons. M. Co. Johnson, Ariz.
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- St. Margaret Copper M. Co. Operated, 1865, in East Canada.
- St. Marie Copper Co. Was a swindle, perpetrated by J. Reilly and W. W. Wilson, two notorious confidence men. Leadville, Colo.
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- Salem M. Co. Operated in the vicinity of the Phoenix mine, Mich., 1865.
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- Samalayuca M. Co. Operated near Chihuahua, Mex., about 1907.

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- San Carlos C. Co. Lands sold to Saddle Mountain M. Co. Christmas, Ariz.
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- San Diego; Cia. Min. Parras de la Fuente, Coah., Mex.
- San Diego M. Co. Near Kingman, Ariz.
- San Domingo G. & C. Co. Merged, 1903, in Picacho Blanco M. Co. Morristown, Ariz.
- San Felipe M. Co. Mexico. No trace of operations secured.
- San Fernando; Cia. Min. De. Zimatlán, Oax., Mex.
- San Fernando C. M. Co. Operated, 1854, near Cienfuegos, Cuba.
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- San Fernando M. Co. New Jersey charter forfeited, 1908, for non-payment of taxes, Ariz.
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- San Francisco C. Co. Campo Seco, Cal.
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- San Francisco Del Oro Mines, Ltd. Was reorganized, 1908, as San Francisco del Oro M. Co., Ltd. Parral, Chih., Mex. See Vol. VIII.
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- San Juan S. & Ref. Co. Property sold by sheriff, 1909, partly to Ross M. & M. Co., and partly to Henrietta M. & M. Co. Silverton, Colo. See Vol. VIII.
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- San Pedro Cons. M. & M. Co. Operated, 1882, in Pinal Co., Ariz.
- San Pedro C. Co. San Pedro, N. M. Idle since 1899.
- San Pedro Dev. Co. Dissolved. Property sold, 1911. Ariz.
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- Santa Fé Mining Co. Luning, Nev.
- Santa Fé Mining & Red. Co. Santa Fé, N. M.
- Santa Rita C. Co. Property sold, 1898, for \$1,000,000. Company practically reorganized as Santa Rita M. Co. Santa Rita, N. M.
- Santa Rita C. & Iron Co. N. M. Property sold, 1899.
- Santa Rita M. Co. Santa Rita, N. M. See Vol. VIII. Property passed to Chino Copper Co., 1909.
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 Seminole Copper M. Co. Property sold, 1904, by sheriff, to Carl Henrich, for \$33,000. Owned by Lincoln Gold & Copper Mining Co. See Vol. III.
 Senator Mines Co. Black Hawk, Colo. See Vol. X.
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 Sheldon Mining Co. Mich. Merged, 1854, in Shelden & Columbian Copper Co.
 Shirley Copper Co. Mich. Absorbed in the 50's by Forest M. Co.
 Shoshone Copper Co. Latah, Wash.
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- Silver Bell C. Co. Arizona. Title changed, 1903, to Imperial C. Co. Silver Bell, Ariz. See Vol. III.
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- Silver & Copper Co. of Ontonagon Rapids, Mich. Operated, 1846.
- Silver-Copper King M. Co. Utah. Charter forfeited, 1910, for nonpayment of taxes.
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- Snowstorm Extension M. Co., Ltd. Succeeded, October, 1909, by Snowstorm Extension C. M. Co. Mullan, Idaho. See Vol. VIII.
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- Snowtop Mining Co. Port Hill, Kootenai Co., Idaho, lands in Boundary district, B. C. See Vol. VIII.
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- South Columbus M. Co. Reconstructed, 1906, as South Columbus Cons. M. Co. See Vol. VIII.
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- Southern Cross M. Co. Lands sold, 1912, to Anaconda C. M. Co., Butte, Mont.
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- Southern Nevada C. Co. Gold Butte, Lincoln Co., Nev. See Vol. X.
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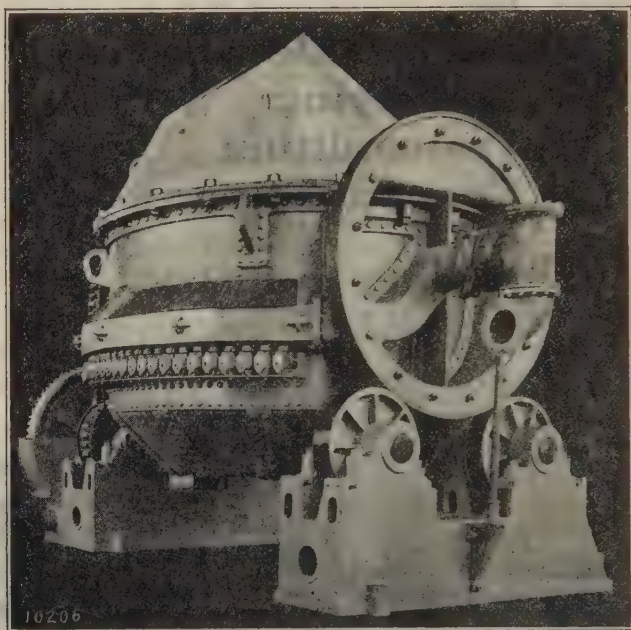
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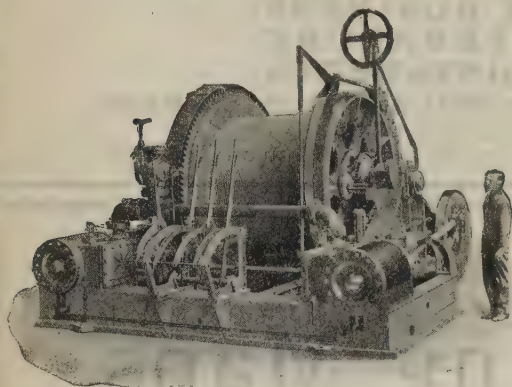
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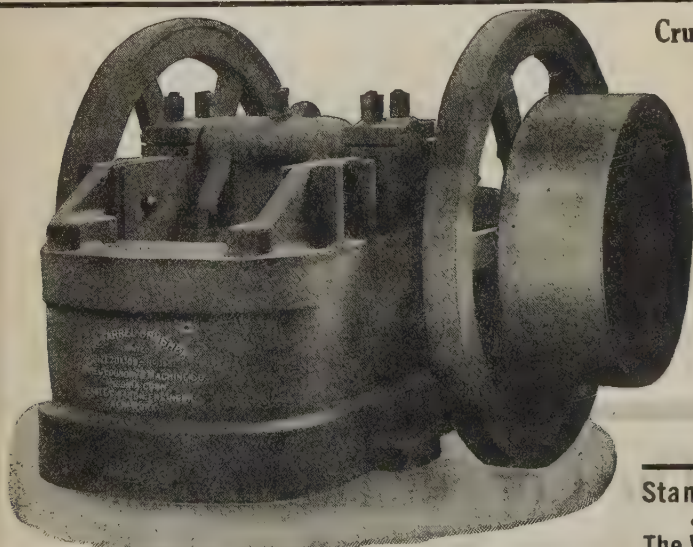
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